India Studies in Business and Economics



Shveta Singh
P.K. Jain
Surendra Singh Yadav

Equity Markets in India

Returns, Risk and Price Multiples

Springer

India Studies in Business and Economics

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To
the Almighty
and
our family members

Preface

Great deeds are usually wrought at great risk

—Herodotus

Equity markets constitute the most important segment of stock exchanges. In fact, status of equity returns is, by and large, reckoned as a barometer of the state of the economy of a country. Returns earned by equity investors on their funds invested in equity markets would be a decisive factor in the growth of such markets. What has been the experience of Indian equity markets constitutes the subject matter of this book.

It would be useful for equity investors to know the expected returns (on a rational basis) and actual returns earned on their investments; equally important for them would be to have an insight into the risk-return trade-off involved in equity investment and the factors that affect the same.

A study comprising, possibly, the largest sample of the National Stock Exchange's (NSE) 500 index companies (representing almost 97 % of the market capitalisation) has not been undertaken so far, in India. The period of the study is spread over two decades (1994–2014) tracking returns right from the inception of the index till the present. This book would, provide a comprehensive view of equity returns in India.

This book would deepen the investor's understanding of equity investment and, thus, help him become a more informed investor. Apart from this, this study would contribute significantly to the existing body of literature on market returns and prove to be of some value to academic researchers and market participants (financial institutions and other intermediaries), regulators and policy makers.

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We are grateful to our students, Apurv Manvar, and our research scholars, Monika Singla, Vandana Bhama and Sadaf Anwar, for their help with the data collection. We thank our student Nishant Vats for his help with data collation and processing and our research scholar Harshita for preparing the table of contents and lists of figures, etc.

Dr. Shveta Singh takes this opportunity to express her deepest gratitude to her *gurus* and co-authors, Prof. P.K. Jain and Prof. Surendra Singh Yadav, for their valuable guidance, inspiration, motivation and untiring efforts in completion of this project. She also thanks Anil, her husband, for his unwavering support and encouragement. Professor P.K. Jain acknowledges the patience, understanding, cooperation and encouragement of his wife, Uma.

Last but not least, we are thankful to all those, not mentioned above, who have helped in carrying out the study, our family members and loved ones for their continuous encouragement and support.

Shveta Singh
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Shveta Singh is an Associate Professor of Finance at the Department of Management Studies, Indian Institute of Technology (IIT Delhi), India. She teaches courses on managerial accounting and financial management, indian financial system and security analysis and portfolio management. Recently, she has developed a course on corporate governance and has also received training by the International Finance Corporation (IFC) in collaboration with the Indian Institute of Corporate Affairs (IICA), for the same. She has contributed to various consulting assignments for organizations like the Directorate General of Supplies & Disposals (DGS&D) and the National Buildings Construction Corporation (NBCC).

Overall, she has more than a decade of professional experience, having spent 3 years in the corporate sector prior to joining academics. She has published research papers in journals of national and international repute. She has been honoured with the "Leadership" award which she accepted on behalf of IIT Delhi from the Institute of Business and Finance Research at the Global Conference on Business and Finance in USA. She also won the "Best in Session" award at the same conference. She was also honoured with the "Literati" award for outstanding research by Emerald Publishing Inc. She also received a mention for the "Most Downloaded Paper" by the Journal of Advances in Management Research, UK.

P.K. Jain is a Professor of Finance at the Department of Management Studies, IIT, Delhi. He has earlier served as the Co-ordinator of the Dalmia Research Programme on Management in Asia and also as the Modi Foundation Chair Professor.

He has a teaching experience of more than 40 years in subjects related to management accounting, financial management, financial analysis, cost analysis and cost control. His research is primarily focused in the area of corporate finance. He has authored/co-authored more than 11 textbooks and 14 research books/monographs. An empiricist, he investigates applied problems using real-business data to have the managerial implications of various financial aspects. He has published more than 160 research papers in the journals of national and international reputation. Recently, his paper "Capital Budgeting Decisions: Evidence from India" has been adjudged with the "Literati Award" by Emerald for

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Surendra Singh Yadav is currently a Professor at the Department of Management Studies, IIT, Delhi. He teaches corporate finance, international finance, international business, and security analysis & portfolio management. He has been a visiting professor at University of Paris, Paris School of Management and INSEEC Paris France, and University of Tampa, USA.

Professor Surendra Singh Yadav has published 14 books. He has contributed more than 130 papers in research journals and about six dozen papers in conferences/seminars. He has contributed more than 30 articles in financial/economic newspapers. He has done several sponsored research and consultancy projects for industry and government. Professor Yadav is the editor-in-chief of the Journal of Advances in Management Research (JAMR), published by Emerald, UK, in collaboration with IIT Delhi. He has been on a large number of expert committees as a member or chairman within the institute as well as outside. He has travelled to several countries such as France, UK, Switzerland, Belgium, Italy, Netherlands, Singapore and USA.

Abbreviations

ADF	Augmented Dickey–Fuller test
ADR	American Depository Receipts
AE	Abnormal Earnings
AIC	Akaike Information Criteria
ANFN	Adaptive Neural-Fuzzy Networks
ANOVA	Analysis of Variance
APARCH	Asymmetric Power Autoregressive Conditional Heteroskedasticity
ARCH	Autoregressive Conditional Heteroskedasticity
ARDL	Autoregressive Distributed Lag test
ARIMA	Autoregressive Integrated Moving Average
β	Beta
BE	Brand Equity
BEML	Bharat Earth Movers Limited
BRIC	Brazil, Russia, India and China
BRICA	Brazil, Russia, India, China and Argentina
BSE	Bombay Stock Exchange
BV/MV	Book Value to Market Value
CAPM	Capital Asset Pricing Model
CART	Classification and Regression Tree
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CRISIL	Credit Rating Information Services of India Limited
CRSP	Centre for Research in Security Prices
CS	Customer Satisfaction
DCL	Degree of Combined Leverage
DF	Dickey Fuller test
DFL	Degree of Financial Leverage
DOL	Degree of Operating Leverage
D_p	Preference Dividend
D/P	Dividend Pay-out ratio
DPS	Dividend per Share

DSE	Dhaka Stock Exchange
EAT	Earnings after Taxes
EBIT	Earnings before Interest and Taxes
ECM	Error-Correction Model
EGARCH	Exponential General Autoregressive Conditional Heteroskedasticity
E/P	Earnings-to-Price ratio
EPS	Earnings per Share
EW	Equal Weighted
E&Y	Ernst and Young
FD	Fixed Deposit
FDI	Foreign Direct Investment
GAAP	Generally Accepted Accounting Principles
GARCH	General Autoregressive Conditional Heteroskedasticity
GARCH-M	General Autoregressive Conditional Heteroscedasticity-Mean
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GSADF	Generalized Supremum Augmented Dickey–Fuller test
ICT	Internet, Communications Technology
IGARCH	Integrated Generalized Autoregressive Conditional Heteroscedasticity
IISL	India Index Services and Products Limited
IMF-FSF	International Monetary Fund-Financial Stability Forum
INR	Indian Rupee
IPO	Initial Public Offering
IRR	Internal Rate of Return
IVP	Indira Vikas Patra
J–J	Johansen–Juselius test
Ke	Cost of Equity
KPSS	Kwiatkowski–Phillips–Schmidt–Shin statistics
KSE	Karachi Stock Exchange
KVP	Kisan Vikas Patra
LDA	Linear Discriminant Analysis
MPS	Market Price per Share
M-TAR	Momentum-Threshold Autoregression test
NASDAQ	National Association of Securities Dealers Automated Quotations
NSC	National Savings Certificates
NSE	National Stock Exchange
NYSE	New York Stock Exchange
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Squares
P/B	Price-to-Book-Value ratio
P/E	Price-to-Earnings ratio
P–P	Philips–Perron statistics
PPF	Public Provident Fund
PSU	Public Sector Undertaking

PwC	PricewaterhouseCoopers
QDA	Quadratic Discriminant Analysis
QMLI	Quasi-Maximum Likelihood Estimation
Q–Q	Quantile–Quantile
RBI	Reserve Bank of India
R_f	Risk-Free Return
R_m	Market Return
ROE	Return on Equity
ROEF	Return on Equity Funds
ROR	Rate of Return
S&P	Standard & Poor's
SADF	Supremum Augmented Dickey–Fuller test
SEBI	Securities and Exchange Board of India
SEC	Securities and Exchange Commission
SENSEX	Sensitive Index
SG	Sales Growth
SIC	Schwarz–Bayesian Information Criteria
SPSS	Statistical Package for Social Sciences
SV	Shareholder Value
TAR	Threshold Autoregressive test
TARCH	Threshold Autoregressive Conditional Heteroskedasticity
TASE	Tel Aviv Stock Exchange
TDS	Thomson Datastream
UK	United Kingdom
ULIPs	Unit Linked Insurance Plans
UNCTAD	United Nations Council for Trade and Development
USA	United States of America
VaR	Value at Risk
V/P	Value-to-Price ratio
WTO	World Trade Organization

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Chapter 1
Introduction

Equity markets constitute the most important segment of stock exchanges; in fact, status of equity returns is, by and large, reckoned as a barometer of the state of the economy of a country. Returns earned by equity investors on their funds invested in equity markets would be a decisive factor in the growth of such markets. What has been the experience of Indian equity markets constitutes the subject matter of the present research monograph.

Therefore, it would be useful for equity investors to know the expected returns (on a rational basis) and actual returns earned on their equity investments; equally important would be to have insight related to the risk–return trade-off involved in equity investment and the parameters that may affect the same.

There is a dearth of recent and systematic data on returns earned from investing in the Indian equities. Perhaps the first formal exercise to analyse data in this regard was conducted by Gupta (1981) in his study entitled '*Rates of Return on Equities: The Indian Experience*', based on the 16-year period, 1960–1976. He extended his research endeavour and published a monograph titled '*Returns on Indian Equity Shares*', presenting equity returns over the period 1980–1999. More than one and a half decades have elapsed since its completion, and there appears to be no recent research effort to study returns on equity shares. This research monograph is an attempt to fill not only this gap but also go beyond the stated objectives of previous researches.

Since 2000, the market conditions have undergone substantial changes and financial markets worldwide have witnessed continual upheavals. Further, to the best of the knowledge of the authors, even though there have been a large number of empirical studies on equity returns, they have focused on one or two specific aspects. Therefore, the broad objective of this research effort titled '*Equity Markets in India: Returns, Risk and Price Multiples*' is to present a comprehensive view of the Indian equity returns for the past two decades (1994–2014). For better exposition, this chapter is divided into five sections. Section "Literature Review" contains the summarized literature review. The objectives of the study undertaken have

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been delineated in section "Objectives". Section "Research Methodology" contains the broad research methodology followed, and section "Layout of the Study" presents the layout of the study. Section "Summary" contains the summary.

Section I: Literature Review

For better comprehension, the literature review has been split between two sub-themes, viz. equity market studies (both international and Indian) and the factors affecting equity returns and risk.

Equity Market Studies

Sehgal and Balakrishnan (2002) evaluated the presence of systematic patterns in stock returns for the Indian stock markets. The results, in general, were in conformity with those for the developed capital markets. Bekaert et al. (2002) studied the effect of liberalization on four variables, viz. the interest rates, net equity capital flows, returns and the dividend yields for the regions of Latin America and Asia. Lee and Saltoglu (2002) analysed the predictive performances of a selection of value-at-risk (VaR) models for the Japanese stock market for the period 1984–2000. Pandey (2003) compared the performance of the various unconditional volatility estimators and conditional volatility models using the time series data of the Nifty index. Jun et al. (2003) studied the behaviour of liquidity in emerging markets for the period 1992–1999. Batra (2004) studied the time variations in volatility and its persistence in the Indian stock market during 1979–2003. Azarmi et al. (2005) examined the empirical association between stock market development and economic growth for a period of 10 years around the Indian market 'liberalization' event (1991).

Dey (2005) deliberated on the effect of economic growth on the portfolio liquidity of global stock exchanges. Belter et al. (2005) presented a new dividend-adjusted blue-chip index for the Danish stock market covering the period 1985–2002. Ince and Porter (2006) compared US equity return data from the Thomson Datastream (TDS) database with similar data from the Centre for Research in Security Prices (CRSP) database to evaluate the TDS database for use in studies involving a large number of individual equities in markets outside the USA. Hamza et al. (2006) examined two alternatives to the capitalization-weighted index for emerging markets, viz. the gross domestic product (GDP)-weighted and the equal-weighted (EW) indices. Keasey and McGuinness (2008) analysed three factors underlying the valuation of initial public offering (IPO) firms within the Hong Kong stock market, viz. the percentage of equity retained by prelisting share

owners, the decision to disclose prospective earnings' forecast and the level of IPO underpricing. Attig et al. (2008) observed that the cost of equity and the agency costs decreased with the presence (and voting numbers) of large shareholders.

Pan and Sinha (2008) studied the return distributions of several indices from the Indian stock market. Mariani et al. (2008) conducted an empirical study of the statistical behaviour of the leading Indian market indices versus the indices of the similarly developing markets of Taiwan and China as well as compared them also with developed markets (i.e. the Standard & Poor's (S&P) 500 index of the USA). Shapira et al. (2009) analysed the functional role of a market index by comparing the results of the New York Stock Exchange (NYSE) and the Tel Aviv Stock Exchange (TASE). Tabaka et al. (2009) recorded the price fluctuations in the Brazilian stock market and tested whether the Brazilian stock returns exhibited a power law distribution. Bhar and Nikolova (2009) examined the level of integration amongst the Brazil, Russia, India and China (BRIC) countries and the rest of the world. Majumder (2012) studied the BRIC markets and compared them with that of the USA. On similar lines, Aktan et al. (2009) analysed the market indices of Brazil, Russia, India, China and Argentina (BRICA) and compared their relationships with the American market for the period 2002–2009.

Kumar and Deo (2009) studied the multifractal properties of the logarithmic returns of the Indian financial indices of the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE). On similar lines, Liu et al. (2010) analysed the sources of multifractality over time for the Shenzhen stock market. Zunino et al. (2010) employed the complexity–entropy causality plane to distinguish amongst the stages of stock market development. Ansari et al. (2010) identified factors contributing to uncertainties during the recession period using statistical analysis, econometrical analysis and adaptive neural fuzzy networks (ANFN) on the National Association of Securities Dealers Automated Quotations (NASDAQ) stock market. Aityan et al. (2010) analysed the degree of global integration between the stock markets of different countries and their influence on each other. More specifically, Paul and Bhajanka (2010) documented the degree of integration of the Indian stock market with the international stock markets. Soni and Shrivastava (2010) classified the Indian stock market data using the combination of three supervised machine learning algorithms, classification and regression tree (CART), linear discriminant analysis (LDA) and quadratic discriminant analysis (QDA).

Mishra et al. (2010) applied a threshold autoregressive (TAR) model on 11-year weekly data for two indices and ten common stocks from the NSE. Karmakar (2010) studied return and volatility spillover effects between large and small stocks in the NSE. Nyberg and Vaihekoski (2010) developed a new monthly, value-weighted, total return index for the Finnish stock market that covered the period from the setting up of the Helsinki Stock Exchange in 1912 till 1970, after which another index became available. Joshi (2010) undertook the study of stock market volatility in the emerging markets of India and China, using daily closing prices, from 2005 to 2009. Bhaduri and Saraogi (2010) analysed the relationship

between yield spread and stock market returns. Dicle et al. (2010) evaluated the emerging Indian market for its efficiency and potential to offer diversification benefits to international investors. Tripathy (2010) studied the expiration day and week effects for Nifty futures by using the Kruskal–Wallis test for the period 2007–2009. Lao and Singh (2011) deliberated on the herding behaviour in the Chinese and Indian stock markets.

Ng et al. (2011) studied the impact of the 2003 Securities and Exchange Commission (SEC) regulation, requiring shareholder approval for all equity-based executive compensation plans. Kim et al. (2011) analysed whether the chief executive officer (CEO) and the chief financial officer (CFO) equity incentives were associated with the firm-specific future stock price crash risk. Cuoco and Kaniel (2011) reported that the benchmark stocks had lower expected returns, lower Sharpe ratios and higher volatilities when compared with similar non-benchmark stocks. John et al. (2011) assessed the impact of geography on agency costs and firm dividend policies. Guresen et al. (2011) evaluated the effectiveness of applying neural network models in stock market predictions. Walid et al. (2011) deployed a Markov-switching exponential general autoregressive conditional heteroscedastic (EGARCH) model to study the dynamic linkage between stock price volatility and exchange rate changes for 4 emerging countries' markets over the period 1994–2009. Bayar et al. (2011) developed a theory on new project financing and equity carve-outs under heterogeneous beliefs amongst investors in the equity market.

Alagidede (2011) examined the stock return predictability in Africa's emerging equity markets. Mishra et al. (2011a, b) tested the presence of nonlinear dependence and deterministic chaos in the rates of return of six Indian stock market indices. Further, Mishra et al. (2011a, b) demonstrated how optimization procedures could be put into practice in the context of the Bombay Stock Exchange (BSE). Maher and Parikh (2011) examined the short-term behaviour of three Indian stock market indices in response to informational shocks. Kumar et al. (2011) analysed the effect of global competition for order flows on the local market which arose due to the listing of American Depository Receipts (ADRs) by six Indian firms on the NYSE. Kenourgios et al. (2011) studied the financial contagion in the BRIC markets and two developed markets [the USA and the UK], over the past five financial crises. Durai and Bhaduri (2011) calculated the correlation statistics of the equity market of India with other countries, using daily price data from 1997 to 2006. Yuksel and Bayrak (2012) analysed the relationship between the cyclical behaviour of stock market indices of the manufacturing, service, finance and technology sectors at the Istanbul Stock Exchange and the GDP of Turkey for the period 1998–2011.

Annaert et al. (2012) introduced a new monthly return index based on the Brussels stock market data for the period 1832–1914. Raghvan and Sarwono (2012) studied the development of the corporate bond market in India, identified the factors which had influenced its development and suggested policy reforms to enhance its development. Krishnan and Mishra (2012) analysed liquidity patterns to detect any commonality across liquidity measures, using one-year intraday data at the NSE.

Factors Affecting Returns

Lau et al. (2002) analysed the relationships between stock returns and six parameters, viz. beta, size, the earnings-to-price (E/P) ratio, the cash flow-to-price ratio, the book-to-market price ratio and sales growth (SG) on the data of the Singapore and Malaysian stock markets for the period 1988–1996. Trueman et al. (2003) presented evidence of anomalies in the Internet firms' stock returns around announcements of their quarterly earnings. Xing and Howe (2003) applied a bivariate GARCH model to the weekly stock index returns from the UK; they documented a significant positive relationship between returns and its variance. Ho et al. (2006) analysed empirically the pricing effects of beta, firm size and book-to-market price using the Hong Kong stock market data. On similar lines, Morelli (2007) analysed the role of beta, size and book-to-market equity as competing risk measurements in explaining the cross-sectional returns of the UK stock market for the period 1980–2000.

Shivakumar (2007) analysed the relationship amongst aggregate earnings, stock market returns and the macroeconomy. Marisetty et al. (2008) studied the security price reactions to announcements of rights issues by listed Indian firms during the period 1997–2005. Lally and Swidler (2008) deliberated on the relationship between the market weight of a single stock and the betas of both stock and the residual portfolio taking the case of Nokia and the Finnish market for the period 1993–2004. Kozaki and Sato (2008) applied the Beck model (developed for turbulent systems that exhibited scaling properties) to stock markets. Rao and Thakur (2008) assessed the optimal hedge ratio and hedge efficiency by employing the Box–Jenkins autoregressive, integrated moving average (ARIMA) technique. Maniar et al. (2009) analysed the effect of expiration day of the index futures and options on the trading volume, variance and price of the underlying shares. Similarly, Debasish (2009) deliberated on the effect of futures trading on the volatility and the operating efficiency of the underlying Indian stock market.

Mahajan and Singh (2009) examined the empirical relationships amongst return, volume and volatility dynamics by using daily data of the sensitive index (Sensex) for the period 1996–2006. The findings of Alti and Sulaeman (2011) suggested that the companies issued new shares when high stock returns coincided with strong demand from institutional investors. Ferreira and Santa-Clara (2011) analysed data from 1927 to 2007 in order to forecast the components of stock market returns. Torres and Tribó (2011) explored the interaction between the shareholder value (SV) and customer satisfaction (CS), as well as their impact on a firm's brand equity (BE) by employing panel data pertaining to 69 firms from 11 nations during the period 2002–2005. Berkman et al. (2011) conducted research on a sample of major international political crises to test the link between changes in disaster risk and subsequent changes (if any) in stock market prices.

Butler et al. (2011) explored the distinction between the composition effect and the net financing. Khansa and Liginlal (2011) analysed the effects of malicious attacks on the stock market returns of information security firms. Todorova and

Vogt (2011) analysed stock data to test whether the power law hypothesis held for the sample stocks. Dichev and Yu (2011) used dollar-weighted returns to assess the properties of actual investor returns on hedge funds and compared them to the buy-and-hold fund returns. Hong and Yogo (2012) analysed whether open interest could be more informative than futures prices in the presence of hedging demand and limited risk absorption capacity in futures markets. Johnson and So (2012) studied the information content of the options and equity volumes when the trading brokers were privately informed and the trade direction was unobserved. Bansal and Khanna (2012) analysed the differences in the level of underpricing of IPOs that were priced through the book-building method vis-a-vis those that were priced through the fixed-price method. Savor (2012) explored how information presence affected post-event performance of stocks (experiencing large price changes).

Becker et al. (2013) tested the prediction; namely, when corporate payout was taxed, internal equity (retained earnings) was cheaper than external equity (share issues). Yalama and Celik (2013) examined whether real or spurious long-term memory characteristics of volatility were present in stock market data. Li (2013) in his findings states that there is a nonlinear wealth transfer from shareholders to creditors causing shareholder loss. Campello and Graham (2013) studied the capital investment, stock issuance and cash saving behaviour of non-technology-intensive manufacturers during the 1990's technology bubble.

From the aforementioned literature review, it is evident that researchers (the world over) have focused on one or the other aspect of rates of return on equities; there is not even a single study which has dealt with returns earned on equity funds by corporate enterprises. This is perhaps the first study which aims at determining the rates of return earned on equity investments by the corporate enterprises; the other contribution of the study is to provide update to Gupta's work on *Rates of Return on Equities*; the notable features of the present work, amongst others, would be to highlight also the risk–return trade-off, from the perspective of equity investors.

Section II: Objectives

The objectives of this study are to cover virtually all the major aspects of equity returns. It is intended to deepen the investor's understanding of equity investment and, thus, help him to become a more informed investor. Moreover, apart from the investor community (both individual and institutional investors), this monograph, we believe, would contribute significantly to the existing body of literature on market returns and prove to be of some value to academicians, researchers and market participants (financial institutions, other intermediaries) regulators and policy makers. The present study is thus much wider in scope than the one

undertaken earlier by Gupta (1981) and another by Gupta and Choudhary (2000). Given that the objective/focus of management research and education is to improve and refresh existing perspectives, then this monograph is an important link in the chain.

Apart from computing actual, expected and market returns, the present study also aims at conducting a disaggregative analysis (based on underlying aspects such as age, size, ownership structure and industry affiliation/sector) to understand the factors affecting returns and risk. Further, to the best of the knowledge of the authors, a study comprising possibly the largest sample of the NSE 500 index companies (representing almost 97 % of the market capitalization) has not been undertaken so far. The period of the study is spread over two decades (1994–2014) tracking returns right from the inception of the index till the present. This research would perhaps be the first of its kind in providing a rather comprehensive outlook towards equity returns in India.

More specifically, in operational terms, the main objectives of the study are as follows:

1. To compute the rates of returns on equities from the corporates' perspective [i.e. rate of return earned on equity funds (ROEF)].
2. To assess the required/expected rate of return [based on 'beta' (β) as the risk measure, computed by employing the capital asset pricing model (CAPM)]. Further, cost of equity (for the investors) has also been measured as a response to the risk undertaken (based on the operating and financial risk).
3. To ascertain the market rates of return (earned) on equities from the investors' perspective (by including both the capital gains and the dividend income).
4. To identify the factors affecting returns (by undertaking a disaggregative analysis of returns focusing on aspects such as age, size, ownership structure and industry affiliation/sector).
5. To conduct an analysis of price multiples and their relationship with returns (price-to-earning (P/E) ratio) with a view to assess/have insight on the market valuation.
6. To examine the volatility in stock returns, with a focus on its behaviour, during the period of the study.
7. To judge the status of market efficiency, during the period of the study, using the 'rational bubbles' methodology.

This monograph is based on the research undertaken to respond to the above-listed objectives. The analysis is based primarily on the secondary data.

Section III: Research Methodology

The research methodology adopted in the present study to analyse equity returns of the sample companies has been delineated hereunder.

Scope

The NSE 500 index of the NSE of India comprises of the top 500 companies listed on the NSE based on their market capitalization. The NSE 500 index represents about 96.76 % of the free-float market capitalization of the stocks listed on NSE as on 31 December 2013. The total traded value for the last six months ending December 2013, of all index constituents, is approximately 97.01 % of the traded value of all stocks on NSE (source: National Stock Exchange (NSE) Website. http://www.nseindia.com/products/content/equities/indices/cnx_500.htm). Hence, virtually, the chosen sample presents a census on equity market returns in India.

The sample is **representative** in nature as the NSE 500 companies represent all industry groups (Refer to Annexure 1.1 for the complete list of the NSE 500 companies). The date of sample selection was 11 March 2013. The period of the study is 1994–2014 (beginning from the inception of the index in 1994 till the present). This universe was chosen on the assumption that it would be (most likely, given the above statistics) an accurate representation of the equity returns in India. Also, selecting the population as large firms with a similar sampling frame of the previous studies facilitates comparison with these studies.

NSE 500 Index Background

The company Standard & Poor's (S&P) introduced its first stock-based index in 1923 in the USA. The index has traditionally been market value-weighted; that is, movements in the prices of stocks with higher market capitalizations (the share price times the number of shares outstanding) have a greater effect on the index than companies with smaller market capitalizations. However, the index is now float-weighted. That is, S&P now calculates the market capitalizations relevant to the index using only the number of shares (called 'float') available for public trading. This transition was made in two steps, the first on 18 March 2005 and the second on 16 September 2005 (source: Wikipedia Website. http://en.wikipedia.org/wiki/S%26P_CNX_500).

Its Indian counterpart, the CNX 500 (hereby referred to as NSE 500), is India's first broad-based benchmark of the Indian capital market. The NSE 500 companies were disaggregated into 72 industry indices, viz. CNX Industry Indices (as on the date of sample selection). Industry weightages in the index reflect the industry weightages in the market. For example, if the banking sector has a 5 % weightage in the universe of stocks traded on NSE, banking stocks in the index would also have a representation of 5 % in the index (source: National Stock Exchange (NSE) Website. http://www.nseindia.com/products/content/equities/indices/cnx_500.htm).

Secondary Data and Analysis

The relevant secondary data were collected from the Bloomberg® database for twenty-one years (1994–2014). The other secondary data sources used to substantiate any missing data were the NSEs Website, Capitaline® and AceEquity® databases and even the constituent companies' annual reports. More importantly, the sample data of 500 companies can be considered representative of the universe as it adequately covers all industry groups (Table 1.1).

Table 1.1 Sector-wise classification of NSE 500 companies

S. No.	Sector (CNX Industry Index)	Number of companies	Percentage of market capitalization
1	Abrasives	1	0.05
2	Air conditioners	1	0.03
3	Aluminium	2	0.57
4	Auto ancillaries	14	1.10
5	Automobiles—2 and 3 wheelers	3	1.55
6	Automobiles—4 wheelers	6	3.21
7	Banks	36	12.87
8	Bearings	2	0.10
9	Brew/distilleries	3	0.32
10	Cables—power	1	0.01
11	Castings/forgings	2	0.12
12	Cement and cement products	12	2.61
13	Ceramics and sanitary ware	1	0.02
14	Chemicals—inorganic	6	0.36
15	Chemicals—organic	2	0.08
16	Chemicals—speciality	4	0.26
17	Cigarettes	3	3.75
18	Compressors/pumps	4	0.07
19	Computers—hardware	1	0.02
20	Computers—software	29	11.60
21	Construction	47	4.60
22	Consumer durables	4	0.24
23	Cycles	1	0.05
24	Diesel engines	3	0.28
25	Diversified	2	1.65
26	Dyes and pigments	1	0.03
27	Electrical equipment	12	2.24

(continued)

Table 1.1 (continued)

S. No.	Sector (CNX Industry Index)	Number of companies	Percentage of market capitalization
28	Electrodes	3	0.06
29	Electronics—industrial	2	0.23
30	Engineering	8	2.02
31	Fastners	1	0.02
32	Fertilizers	5	0.28
33	Finance	31	2.88
34	Finance—housing	4	0.30
35	Financial institution	4	0.91
36	Food and food processing	9	0.72
37	Gas	6	1.26
38	Gems jewellery and watches	4	0.52
39	Hotels	4	0.18
40	Leather and leather products	1	0.08
41	Media and entertainment	9	0.81
42	Metals	1	0.91
43	Mining	7	4.96
44	Miscellaneous	8	0.43
45	Oil exploration/production	6	5.89
46	Packaging	6	0.15
47	Paints	4	0.94
48	Paper and paper products	3	0.04
49	Personal care	7	1.65
50	Pesticides and agrochemicals	4	0.16
51	Petrochemicals	3	0.27
52	Pharmaceuticals	33	5.12
53	Plastic and plastic products	8	0.22
54	Power	18	9.76
55	Printing and publishing	3	0.13
56	Refineries	7	2.20
57	Refractories	1	0.01
58	Shipping	8	0.75
59	Solvent extraction	3	0.05
60	Steel and steel products	19	2.72
61	Sugar	5	0.15
62	Tea and coffee	3	0.23
63	Telecommunication—equipment	2	0.03
64	Telecommunication—services	7	3.01
65	Textile machinery	1	0.03

(continued)

Table 1.1 (continued)

S. No.	Sector (CNX Industry Index)	Number of companies	Percentage of market capitalization
66	Textile products	10	0.26
67	Textiles—cotton	1	0.00
68	Textiles—synthetic	5	0.08
69	Trading	4	0.95
70	Transmission towers	3	0.06
71	Travel and transport	10	0.52
72	Tyres	5	0.22
73	Sector not available	1	0.07
	Total	500	100

Data Analysis

The entire set of data has been analysed using Microsoft Excel spreadsheets and the statistics software SPSS. Well-accepted tools and techniques used in financial management constitute the basis of the analysis. Specialized financial software like EViews 8® has been used to assess volatility and the financial statistics software R® version 2.15.3; package 'apt' has been deployed for the 'rational bubbles' methodology. For the purpose of the study, key return ratios (say, rates of return (RoR) on equity funds) and pricing models (say, P/E ratios) have been employed for understanding investment decisions and returns earned on equity investments.

All the ratios were calculated on a year-to-year basis for the sample companies. To study the trend and its implications, descriptive statistical values/positional values, i.e. mean, standard deviation, coefficient of variation, skewness, kurtosis, median and quartiles, have also been computed for each year. Further, to study returns over different holding periods, the returns have been computed for holding periods of 5, 10 and 15 years. Beta (β) values have been taken as the risk measure, and autoregressive tools have been deployed to estimate market efficiency and volatility levels.

To do away with the influence of extreme values, they have been excluded from computing average values. However, where their inclusion has been considered important, say, for preparation of frequency distribution, extreme values have also been considered.

The rationale for the study period beginning in 1994 is that the NSE was set up in the same year. The twenty-one-year period (1994–2014) of the study has been bifurcated into two subperiods/phases to ascertain whether there has been any significant change in equity returns of the sample companies over the years. For the purpose of the analysis, the first nine years, w.e.f. 1 April 1994 to 31 March 2003 (for brevity referred to as 1994–2003), are referred to as phase 1 and the next eleven years, w.e.f. 1 April 2003 to 31 March 2014 (for brevity referred to as 2003–2014), as phase 2. It is pertinent to note here that the years 1994–2014 indicate the period

beginning from the Indian financial year, that is, 1 April 1993 and ending on the closing of the financial year of 31 March 2014. The same holds true for all subsequent notations.

Further, the period of the study is of particular importance because of the recession (originating due to the American financial crisis) that impacted the world economy towards the second half of 2008. According to the United Nations Council on Trade and Development (UNCTAD) investment brief (1 November 2009), the year 2008 marked the end of a growth cycle in global foreign direct investment (FDI) with worldwide capital flows down by more than 20 %. Due to the global financial crisis, the capacity of companies to invest was weakened by reduced access to financial resources, both internally and externally. The propensity to invest was also affected by the collapsed growth prospects and heightened risks. Developed countries suffered from a one-third contraction in total FDI inflows in 2008, being at the epicentre of the crisis. In India, total net capital flows reduced from US$17.3 billion in April–June 2007 to US$13.2 billion in April–June 2008 (source: UNCTAD investment briefs, investment issues analysis branch of UNCTAD 2009).

Consequently, phase 2 (2003–2014) of the study has been subdivided into two subphases to ascertain the impact of recession. The five years of 2003–2008 denote the prerecession phase (phase 3), and the subsequent six years of 2009–2014 denote the post-recession phase (phase 4) for the purpose of this study (Jain et al. 2013).

The 't' test has been administered to assess whether equity returns differed/changed during the second phase compared to the first phase, for the sample companies and amongst its constituent sectors, respectively. For the purpose of the disaggregative analysis, the 500 companies were regrouped into constituent sectors to reduce the number of sectors to 10 from 73, primarily for the sake of providing an adequate/good number of companies in each sector and for the sake of better statistical analysis (Table 1.2).

It is pertinent to state here that the Gupta (1981) and Gupta and Choudhary (2000) have conducted studies in the past spanning from 1960 to 1976 and 1980 to 1999, respectively. An effort has been made to link the findings of these studies with the current one with the aim to establish trends (if any) on equity returns over the past two decades (to provide a broader perspective).

Section IV: Layout of the Study

Chapter 2 which follows presents the rates of returns on equities from the corporates' perspective (based on ROE estimations). Chapter 3 assesses the required/expected rate of return [based on 'beta' (β) as the risk measure, computed by employing the capital asset pricing model (CAPM)]. It also measures the cost of equity from the investors' perspective as a reward for the risk undertaken. Chapter 4 contains the estimations of the market rates of return on equities from the investors' perspective (by including both the capital gains and the dividend income) for

Table 1.2 Sector-wise reclassification of sample companies

Sectors	Number of companies	Percentage of companies
Commodity (metal, metal products, mining, oil and gas)	*53*	*10.60*
Aluminium	2	
Castings/forgings	2	
Gas	6	
Metals	1	
Mining	8	
Oil exploration/production	6	
Refineries	7	
Refractories	1	
Steel and steel products	19	
Sector not available	1	
Consumer goods	*40*	*8.00*
Air conditioners	1	
Brew/distilleries	3	
Cigarettes	3	
Consumer durables	4	
Gems jewellery and watches	4	
Leather and leather products	1	
Retail	1	
Personal care	7	
Plastic and plastic products	8	
Sugar	5	
Tea and coffee	3	
Finance	*76*	*15.20*
Banks	36	
Finance	31	
Finance—housing	4	
Financial institution	4	
Stock broking/trading	1	
Health care	*36*	*7.20*
Hospitals	3	
Pharmaceuticals	33	
ICT (Internet, communications and technology)	*42*	*8.40*
Computers—hardware	1	
Computers—software	29	
Telecommunication—equipment	2	
Telecommunication—services	7	
Transmission towers	3	

(continued)

Table 1.2 (continued)

Sectors	Number of companies	Percentage of companies
Infrastructure	*59*	*11.80*
Cement and cement products	12	
Construction	47	
Power and electricals	*51*	*10.20*
Cables—power	1	
Compressors/pumps	4	
Electrical equipment	12	
Electrodes	3	
Electronics—industrial	2	
Electrical engineering	8	
Fastners	1	
Power generation	19	
Electricity trading	1	
Transport	*52*	*10.40*
Auto ancillaries	14	
Automobiles—2 and 3 wheelers	3	
Automobiles—4 wheelers	6	
Bearings	2	
Cycles	1	
Diesel engines	3	
Shipping	8	
Travel and transport	10	
Tyres	5	
Textile and chemicals	*50*	*10.00*
Abrasives	1	
Chemicals—inorganic	6	
Chemicals—organic	2	
Chemicals—speciality	4	
Dyes and pigments	1	
Fertilizers	5	
Paints	4	
Pesticides and agrochemicals	4	
Petrochemicals	3	
Solvent extraction	3	
Textile machinery	1	
Textile products	10	
Textiles—cotton	1	
Textiles—synthetic	5	
Miscellaneous	*41*	*8.20*

(continued)

Table 1.2 (continued)

Sectors	Number of companies	Percentage of companies
Sanitary ware	1	
Diversified	2	
Food and food processing	9	
Hotels	4	
Entertainment	9	
Education	1	
Packaging	6	
Roses	1	
Apparel	1	
Paper and paper products	3	
Printing and publishing	3	
Total	500	100

different holding periods. Chapter 5 undertakes a disaggregative analysis of returns focusing on aspects such as age, size, ownership structure and industry affiliation/sector. Chapter 6 analyses price multiples and their relationship with returns. Chapter 7 ascertains the volatility present in the returns, during the period of the study. Chapter 8 comments on the level of market efficiency using the 'rational bubbles' methodology. Concluding the study, Chap. 9 integrates the observed facts about returns (Chaps. 2, 3 and 4), the disaggregative analysis (Chap. 5), the price multiples (Chap. 6), volatility and its behaviour (Chap. 7) and the level of market efficiency (Chap. 8) into a comprehensive perspective of how the Indian equity market functions. The conceptual framework evolved in the monograph would be useful to the academia and researchers, not only in India but also in other developed and developing economies, and would be of value to regulators such as SEBI, policy makers, practitioners (financial institutions, mutual funds) and individual and professional investors.

Section V: Summary

The present study aims at having an insight into the equity returns of the 500 companies of the NSE 500 index of the NSE. To the best of the knowledge of the authors, a study comprising possibly the largest sample representing almost 97 % of the market capitalization has not been undertaken so far. The period of the study is spread over the time span of two decades (1994–2014) tracking returns and other related aspects right from the inception of the index till the present. The study uses secondary data.

The present study covers virtually all the major aspects of equity returns. It also conducts a disaggregative analysis (based on underlying factors such as age, size, ownership structure and industry affiliation/sector) to understand the factors affecting returns and risk. The data analysis is based on well-accepted tools and techniques in financial management and statistics. This research would perhaps be the first of its kind in providing a comprehensive outlook towards equity returns in India.

Annexure 1.1: Constituent Companies and Sectors of NSE 500 (as on 11 March 2013)

Company name	Industry
3M India Ltd.	Trading
ABB Ltd.	Electrical equipment
ABG Shipyard Ltd.	Shipping
ACC Ltd.	Cement and cement products
AIA Engineering Ltd.	Electrical equipment
Aarti Industries Ltd.	Chemicals—speciality
Aban Offshore Ltd.	Oil exploration/production
Adani Enterprises Ltd.	Trading
Adani Ports and Special Economic Zone Ltd.	Shipping
Adani Power Ltd.	Power
Aditya Birla Nuvo Ltd.	Finance
Advanta India Ltd.	Food and food processing
Agro Tech Foods Ltd.	Solvent extraction
AkzoNobel India Ltd.	Paints
Allahabad Bank	Banks
Allcargo Logistics Ltd.	Travel and transport
Alok Industries Ltd.	Textile products
Alstom India Ltd.	Electrical equipment
Alstom T&D India Ltd.	Electrical equipment
Amara Raja Batteries Ltd.	Auto ancillaries
Ambuja Cements Ltd.	Cement and cement products
Amtek Auto Ltd.	Auto ancillaries
Amtek India Ltd.	Auto ancillaries
Anant Raj Industries Ltd.	Construction
Andhra Bank	Banks
Ansal Properties & Infrastructure Ltd.	Construction
Apollo Hospitals Enterprises Ltd.	Miscellaneous
Apollo Tyres Ltd.	Tyres
Aptech Ltd.	Computers—software

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(continued)

Company name	Industry
Arshiya International Ltd.	Travel and transport
Arvind Ltd.	Textile products
Asahi India Glass Ltd.	Auto ancillaries
Ashok Leyland Ltd.	Automobiles—4 wheelers
Asian Paints Ltd.	Paints
Astra Zenca Pharma India Ltd.	Pharmaceuticals
Atul Ltd.	Chemicals—speciality
Aurobindo Pharma Ltd.	Pharmaceuticals
Autoline Industries Ltd.	Auto ancillaries
Automotive Axles Ltd.	Auto ancillaries
Axis Bank Ltd.	Banks
BASF India Ltd.	Chemicals—speciality
BEML Ltd.	Engineering
BF Utilities Ltd.	Construction
BGR Energy Systems Ltd.	Engineering
BOC India Ltd.	Gas
Bajaj Auto Ltd.	Automobiles—2 and 3 wheelers
Bajaj Electricals Ltd.	Consumer durables
Bajaj Finance Ltd.	Finance
Bajaj Finserv Ltd.	Finance
Bajaj Hindusthan Ltd.	Sugar
Bajaj Holdings & Investment Ltd.	Finance
Balkrishna Industries Ltd.	Tyres
Ballarpur Industries Ltd.	Paper and paper products
Balmer Lawrie & Co. Ltd.	Travel and transport
Balrampur Chini Mills Ltd.	Sugar
Banco Products (India) Ltd.	Auto ancillaries
Bank of Baroda	Banks
Bank of India	Banks
Bannari Amman Sugars Ltd.	Sugar
Bata India Ltd.	Leather and leather products
Berger Paints India Ltd.	Paints
Bhansali Engineering Polymers Ltd.	Petrochemicals
Bharat Electronics Ltd.	Electronics—industrial
Bharat Forge Ltd.	Castings/forgings
Bharat Heavy Electricals Ltd.	Electrical equipment
Bharat Petroleum Corporation Ltd.	Refineries
Bharti Airtel Ltd.	Telecommunication—services
Bhushan Steel Ltd.	Steel and steel products
Biocon Ltd.	Pharmaceuticals

(continued)

(continued)

Company name	Industry
Birla Corporation Ltd.	Cement and cement products
Blue Dart Express Ltd.	Travel and transport
Blue Star Ltd.	Air conditioners
Bombay Burmah Trading Corporation Ltd.	Food and food processing
Bombay Dyeing & Manufacturing Co. Ltd.	Textiles—synthetic
Bombay Rayon Fashions Ltd.	Textile products
Bosch Ltd.	Auto ancillaries
Brigade Enterprises Ltd.	Construction
Britannia Industries Ltd.	Food and food processing
CESC Ltd.	Power
CMC Ltd.	Computers—software
CORE Education & Technologies Ltd.	Computers—software
CRISIL Ltd.	Finance
Cadila Healthcare Ltd.	Pharmaceuticals
Cairn India Ltd.	Oil exploration/production
Can Fin Homes Ltd.	Finance—housing
Canara Bank	Banks
Carborundum Universal Ltd.	Abrasives
Castrol (India) Ltd.	Petrochemicals
Central Bank of India	Banks
Century Enka Ltd.	Textiles—synthetic
Century Plyboards (India) Ltd.	Construction
Century Textile & Industries Ltd.	Cement and cement products
Chambal Fertilizers & Chemicals Ltd.	Fertilizers
Chennai Petroleum Corporation Ltd.	Refineries
Cholamandalam Investment and Finance Company Ltd.	Finance
Cipla Ltd.	Pharmaceuticals
City Union Bank Ltd.	Banks
Clariant Chemicals (India) Ltd.	Dyes and pigments
Coal India Ltd.	Mining
Colgate Palmolive (India) Ltd.	Personal care
Container Corporation of India Ltd.	Travel and transport
Coromandel International Ltd.	Fertilizers
Corporation Bank	Banks
Cox & Kings Ltd.	Travel and transport
Crompton Greaves Ltd.	Electrical equipment
Cummins India Ltd.	Diesel engines
D B Realty Ltd.	Construction
DCM Shriram Consolidated Ltd.	Diversified
DCW Ltd.	Chemicals—inorganic

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(continued)

Company name	Industry
DLF Ltd.	Construction
Dabur India Ltd.	Personal care
Deccan Chronicle Holdings Ltd.	Printing and publishing
Deepak Fertilisers & Petrochemicals Corp. Ltd.	Chemicals—inorganic
Delta Corp Ltd.	Construction
Dena Bank	Banks
Development Credit Bank Ltd.	Banks
Dewan Housing Finance Corporation Ltd.	Finance—housing
Dhanlaxmi Bank Ltd.	Banks
Dish TV India Ltd.	Media and entertainment
Dishman Pharmaceuticals & Chemicals Ltd.	Pharmaceuticals
Divi's Laboratories Ltd.	Pharmaceuticals
Dr. Reddy's Laboratories Ltd.	Pharmaceuticals
Dredging Corporation of India Ltd.	Shipping
Dynamatic Technologies Ltd.	Compressors/pumps
E.I.D. Parry (India) Ltd.	Sugar
EIH Ltd.	Hotels
ESAB India Ltd.	Electrodes
Edelweiss Financial Services Ltd.	Finance
Educomp Solutions Ltd.	Computers—software
Eicher Motors Ltd.	Automobiles—4 wheelers
Elder Pharmaceuticals Ltd.	Pharmaceuticals
Electrosteel Castings Ltd.	Castings/forgings
Elgi Equipments Ltd.	Compressors/pumps
Emami Ltd.	Personal care
Engineers India Ltd.	Engineering
Entertainment Network India Ltd.	Media and entertainment
Era Infra Engineering Ltd.	Construction
Eros Intl Media Ltd.	Media and entertainment
Escorts Ltd.	Automobiles—4 wheelers
Essar Oil Ltd.	Refineries
Essel Propack Ltd.	Packaging
Exide Industries Ltd.	Auto ancillaries
FDC Ltd.	Pharmaceuticals
Fag Bearings India Ltd.	Bearings
Federal Bank Ltd.	Banks
Federal-Mogul Goetze (India) Ltd.	Auto ancillaries
Financial Technologies (India) Ltd.	Computers—software
Finolex Cables Ltd.	Cables—power
Finolex Industries Ltd.	Plastic and plastic products

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(continued)

Company name	Industry
Firstsource Solutions Ltd.	Computers—software
FlexiTuff International Ltd.	Packaging
Fortis Healthcare Ltd.	Miscellaneous
Fresenius Kabi Oncology Ltd.	Pharmaceuticals
Future Capital Holdings Ltd.	Finance
Future Ventures India Ltd.	Finance
GAIL (India) Ltd.	Gas
GHCL Ltd.	Chemicals—inorganic
GMR Infrastructure Ltd.	Construction
GTL Ltd.	Telecommunication—services
GVK Power & Infrastructures Ltd.	Power
Gammon India Ltd.	Construction
Gammon Infrastructure Projects Ltd.	Construction
Gateway Distriparks Ltd.	Travel and transport
Gati Ltd.	Travel and transport
Geojit BNP Paribas Financial Services Ltd.	Finance
Geometric Ltd.	Computers—software
Gillette India Ltd.	Personal care
Gitanjali Gems Ltd.	Gems jewellery and watches
GlaxoSmithKline Consumer Healthcare Ltd.	Food and food processing
GlaxoSmithKline Pharmaceuticals Ltd.	Pharmaceuticals
Glenmark Pharmaceuticals Ltd.	Pharmaceuticals
Godfrey Phillips India Ltd.	Cigarettes
Godrej Consumer Products Ltd.	Personal care
Godrej Industries Ltd.	Chemicals—inorganic
Godrej Properties Ltd.	Construction
Graphite India Ltd.	Electrodes
Grasim Industries Ltd.	Cement and cement products
Great Eastern Shipping Co. Ltd.	Shipping
Great Offshore Ltd.	Oil exploration/production
Greaves Cotton Ltd.	Diesel engines
Gujarat Alkalies & Chemicals Ltd.	Chemicals—inorganic
Gujarat Fluorochemicals Ltd.	Chemicals—organic
Gujarat Gas Co. Ltd.	Gas
Gujarat Industries Power Co. Ltd.	Power
Gujarat Mineral Development Corporation Ltd.	Mining
Gujarat NRE Coke Ltd.	Mining
Gujarat Narmada Valley Fertilisers Co. Ltd.	Fertilizers
Gujarat Pipavav Port Ltd.	Shipping
Gujarat State Fertilizers & Chemicals Ltd.	Fertilizers

(continued)

(continued)

Company name	Industry
Gujarat State Petronet Ltd.	Gas
H.E.G. Ltd.	Electrodes
HCL Infosystems Ltd.	Computers—hardware
HCL Technologies Ltd.	Computers—software
HDFC Bank Ltd.	Banks
HSIL Ltd.	Packaging
HT Media Ltd.	Printing and publishing
Hathway Cable & Datacom Ltd.	Media and entertainment
Havells India Ltd.	Electrical equipment
Hero MotoCorp Ltd.	Automobiles—2 and 3 wheelers
Hexaware Technologies Ltd.	Computers—software
Himachal Fut Com Ltd.	Telecommunication—equipment
Himatsingka Seide Ltd.	Textile products
Hindalco Industries Ltd.	Aluminium
Hindustan Construction Co. Ltd.	Construction
Hindustan Oil Exploration Co. Ltd.	Oil exploration/production
Hindustan Petroleum Corporation Ltd.	Refineries
Hindustan Unilever Ltd.	Diversified
Hindustan Zinc Ltd.	Metals
Honeywell Automation India Ltd.	Electronics—industrial
Hotel Leela Venture Ltd.	Hotels
Housing Development Finance Corporation Ltd.	Finance—housing
Housing Development and Infrastructure Ltd.	Construction
Hubtown Ltd.	Construction
I T C Ltd.	Cigarettes
ICICI Bank Ltd.	Banks
ICRA Ltd.	Finance
IDBI Bank Ltd.	Banks
IDFC Ltd.	Financial institution
IFCI Ltd.	Financial institution
IL&FS Engineering and Construction Company Ltd.	Construction
ING Vysya Bank Ltd.	Banks
IRB Infrastructure Developers Ltd.	Construction
IVRCL Ltd.	Construction
Idea Cellular Ltd.	Telecommunication—services
Ind-Swift Laboratories Ltd.	Pharmaceuticals
India Cements Ltd.	Cement and cement products
India Glycols Ltd.	Chemicals—organic
India Infoline Ltd.	Finance
Indiabulls Financial Services Ltd.	Finance

(continued)

(continued)

Company name	Industry
Indiabulls Power Ltd.	Power
Indiabulls Real Estate Ltd.	Construction
Indiabulls Securities Ltd.	Finance
Indian Bank	Banks
Indian Hotels Co. Ltd.	Hotels
Indian Oil Corporation Ltd.	Refineries
Indian Overseas Bank	Banks
Indo Rama Synthetics Ltd.	Textiles—synthetic
Indraprastha Gas Ltd.	Gas
Indraprastha Medical Corporation Ltd.	Miscellaneous
IndusInd Bank Ltd.	Banks
Info Edge (India) Ltd.	Computers—software
Infosys Ltd.	Computers—software
Infotech Enterprises Ltd.	Computers—software
Ingersoll Rand (India) Ltd.	Compressors/pumps
Innoventive Industries Ltd.	Steel and steel products
Ipca Laboratories Ltd.	Pharmaceuticals
J.B. Chemicals & Pharmaceuticals Ltd.	Pharmaceuticals
J.Kumar Infraprojects Ltd.	Construction
JBF Industries Ltd.	Textiles—synthetic
JK Tyre & Industries Ltd.	Tyres
JM Financial Ltd.	Finance
JSW Energy Ltd.	Power
JSW ISPAT Steel Ltd.	Steel and steel products
JSW Steel Ltd.	Steel and steel products
Jagran Prakashan Ltd.	Printing and publishing
Jai Balaji Industries Ltd.	Steel and steel products
Jai Corp Ltd.	Plastic and plastic products
Jain Irrigation Systems Ltd.	Plastic and plastic products
Jaiprakash Associates Ltd.	Construction
Jaiprakash Power Ventures Ltd.	Power
Jammu & Kashmir Bank Ltd.	Banks
Jaypee Infratech Ltd.	Construction
Jet Airways (India) Ltd.	Travel and transport
Jindal Poly Films Ltd.	Packaging
Jindal Saw Ltd.	Steel and steel products
Jindal South West Hold Ltd.	Finance
Jindal Stainless Ltd.	Steel and steel products
Jindal Steel & Power Ltd.	Steel and steel products
Jubilant Foodworks Ltd.	Food and food processing

(continued)

(continued)

Company name	Industry
Jubilant Life Sciences Ltd.	Pharmaceuticals
Jyoti Structures Ltd.	Transmission towers
K.S. Oils Ltd.	Solvent extraction
KCP Ltd.	Cement and cement products
KPIT Cummins Infosystem Ltd.	Computers—software
KSB Pumps Ltd.	Compressors/pumps
KSK Energy Ventures Ltd	Power
Kajaria Ceramics Ltd.	Ceramics and sanitary ware
Kalpataru Power Transmission Ltd.	Transmission towers
Kansai Nerolac Paints Ltd.	Paints
Karnataka Bank Ltd.	Banks
Karur Vysya Bank Ltd.	Banks
Karuturi Global Ltd.	Miscellaneous
KEC International Ltd.	Transmission towers
Kemrock Industries and Exports Ltd.	Plastic and plastic products
Kesoram Industries Ltd.	Tyres
Kotak Mahindra Bank Ltd.	Banks
Kwality Dairy (India) Ltd.	Food and food processing
L&T Finance Holdings Ltd.	Finance
LIC Housing Finance Ltd.	Finance—housing
Lakshmi Machine Works Ltd.	Textile machinery
Lakshmi Vilas Bank Ltd.	Banks
Lanco Infratech Ltd.	Construction
Larsen & Toubro Ltd.	Engineering
Lovable Lingerie Ltd.	Textile products
Lupin Ltd.	Pharmaceuticals
MRF Ltd.	Tyres
MVL Ltd.	Construction
Madras Cements Ltd.	Cement and cement products
Mahanagar Telephone Nigam Ltd.	Telecommunication—services
Maharashtra Seamless Ltd.	Steel and steel products
Mahindra & Mahindra Financial Services Ltd.	Finance
Mahindra & Mahindra Ltd.	Automobiles—4 wheelers
Mahindra Lifespace Developers Ltd.	Construction
Man Infraconstruction Ltd.	Construction
Mandhana Industries Ltd.	Textile products
Mangalore Chemicals & Fertilizers Ltd.	Pesticides and agrochemicals
Mangalore Refinery & Petrochemicals Ltd.	Refineries
Marico Ltd.	Personal care
Maruti Suzuki India Ltd.	Automobiles—4 wheelers

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(continued)

Company name	Industry
Mastek Ltd.	Computers—software
Max India Ltd.	Packaging
McLeod Russel India Ltd.	Tea and coffee
Mercator Ltd.	Mining
Merck Ltd.	Pharmaceuticals
Mind Tree Ltd.	Computers—software
Monnet Ispat and Energy Ltd.	Steel and steel products
Monsanto India Ltd.	Pesticides and agrochemicals
Motherson Sumi Systems Ltd.	Auto ancillaries
Motilal Oswal Financial Services Ltd.	Finance
Mphasis Ltd.	Computers—software
Muthoot Finance Ltd.	Finance
NCC Ltd.	Construction
NHPC Ltd.	Power
NIIT Ltd.	Computers—software
NMDC Ltd.	Mining
NTPC Ltd.	Power
National Aluminium Co. Ltd.	Aluminium
Nava Bharat Ventures Ltd.	Power
Navneet Publications (India) Ltd.	Printing and publishing
Network18 Media & Investments Ltd.	Finance
Neyveli Lignite Corporation Ltd.	Power
Nilkamal Ltd.	Plastic and plastic products
Noida-Toll Bridge Co. Ltd.	Construction
Oberoi Realty Ltd.	Construction
Oil & Natural Gas Corporation Ltd.	Oil exploration/production
Oil India Ltd.	Oil exploration/production
Omaxe Ltd.	Construction
Opto Circuits (I) Ltd.	Pharmaceuticals
Oracle Financial Services Software Ltd.	Computers—software
Orbit Corporation Ltd.	Construction
Orchid Chemicals & Pharmaceuticals Ltd.	Pharmaceuticals
Orient Paper & Industries Ltd.	Cement and cement products
Oriental Bank of Commerce	Banks
Oriental Hotels Ltd.	Hotels
Orissa Min Dev Co. Ltd.	Mining
Oswal Chemicals & Fertilizers Ltd.	Trading
PSL Ltd.	Steel and steel products
PTC India Ltd.	Power
Page Industries Ltd.	Textile products

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Company name	Industry
Pantaloon Retail (India) Ltd.	Miscellaneous
Parsvnath Developer Ltd.	Construction
Patel Engineering Ltd.	Construction
Peninsula Land Ltd.	Construction
Persistent Systems Ltd.	Computers—software
Petronet LNG Ltd.	Gas
Pfizer Ltd.	Pharmaceuticals
Phoenix Mills Ltd.	Construction
Pidilite Industries Ltd.	Chemicals—speciality
Pipavav Defence and Offshore Engineering Company Ltd.	Shipping
Piramal Enterprises Ltd.	Pharmaceuticals
Polaris Financial Technology Ltd.	Computers—software
Power Finance Corporation Ltd.	Financial institution
Power Grid Corporation of India Ltd.	Power
Praj Industries Ltd.	Engineering
Prakash Industries Ltd.	Steel and steel products
Prestige Estates Projects Ltd.	Construction
Prime Focus Ltd	Media and entertainment
Prism Cement Ltd.	Cement and cement products
Procter & Gamble Hygiene & Health Care Ltd.	Personal care
Punj Lloyd Ltd.	Construction
Punjab National Bank	Banks
Puravankara Projects Ltd.	Construction
Radico Khaitan Ltd	Brew/distilleries
Rajesh Exports Ltd.	Gems jewellery and watches
Rallis India Ltd.	Pesticides and agrochemicals
Ramco Industries Ltd.	Cement and cement products
Ramky Infra Ltd.	Construction
Ranbaxy Laboratories Ltd.	Pharmaceuticals
Rashtriya Chemicals & Fertilizers Ltd.	Fertilizers
Raymond Ltd.	Textile products
Redington (India) Ltd.	Trading
Rei Agro Ltd.	Food and food processing
Reliance Capital Ltd.	Finance
Reliance Communications Ltd.	Telecommunication—services
Reliance Industrial Infrastructure Ltd.	Engineering
Reliance Industries Ltd.	Refineries
Reliance Infrastructure Ltd.	Power
Reliance Power Ltd.	Power
Religare Enterprises Ltd.	Finance

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Company name	Industry
Rolta India Ltd.	Computers—software
Ruchi Soya Industries Ltd.	Solvent extraction
Rural Electrification Corporation Ltd.	Financial institution
S. Kumars Nationwide Ltd.	Textile products
S.E. Investments Ltd.	Finance
SKF India Ltd.	Bearings
SKS Microfinance Ltd.	Finance
SREI Infrastructure Finance Ltd.	Finance
SRF Ltd.	Textiles—synthetic
Sadbhav Engineering Ltd	Construction
Sanofi India Ltd.	Pharmaceuticals
Sesa Goa Ltd.	Mining
Shanthi Gears Ltd.	Auto ancillaries
Shasun Pharmaceuticals Ltd.	Pharmaceuticals
Shipping Corporation of India Ltd.	Shipping
Shoppers Stop Ltd.	Miscellaneous
Shree Ashtavinayak Cine Vision Ltd.	Media and entertainment
Shree Cement Ltd.	Cement and cement products
Shree Renuka Sugars Ltd.	Sugar
Shrenuj & Co. Ltd.	Gems jewellery and watches
Shri Lakshmi Cotsyn Ltd.	Textiles—cotton
Shriram City Union Finance Ltd.	Finance
Shriram Transport Finance Co. Ltd.	Finance
Siemens Ltd.	Electrical equipment
Simplex Infrastructures Ltd.	Construction
Sintex Industries Ltd.	Plastic and plastic products
Sobha Developers Ltd.	Construction
Sona Koyo Steering Systems Ltd.	Auto ancillaries
Sonata Software Ltd.	Computers—software
South Indian Bank Ltd.	Banks
State Bank of Bikaner & Jaipur Ltd.	Banks
State Bank of India	Banks
State Bank of Travancore	Banks
Steel Authority of India Ltd.	Steel and steel products
Sterling Biotech Ltd.	Pharmaceuticals
Sterlite Technologies Ltd.	Electrical equipment
Strides Arcolab Ltd.	Pharmaceuticals
Sujana Towers Ltd.	Telecommunication—equipment
Sun Pharmaceutical Industries Ltd.	Pharmaceuticals
Sun TV Network Ltd.	Media and entertainment

(continued)

(continued)

Company name	Industry
Sundaram Finance Ltd.	Finance
Sundram Fasteners Ltd.	Fastners
Sunteck Realty Ltd.	Construction
Supreme Industries Ltd.	Plastic and plastic products
Supreme Infrastructure India Ltd.	Construction
Supreme Petrochem Ltd.	Petrochemicals
Suzlon Energy Ltd.	Electrical equipment
Swaraj Engines Ltd.	Diesel engines
Syndicate Bank	Banks
TD Power Systems Ltd.	Electrical equipment
TTK Prestige Ltd.	Consumer durables
TV18 Broadcast Ltd.	Media and entertainment
TVS Motor Company Ltd.	Automobiles—2 and 3 wheelers
Tamil Nadu Newsprint & Papers Ltd.	Paper and paper products
Tata Chemicals Ltd.	Chemicals—inorganic
Tata Coffee Ltd.	Tea and coffee
Tata Communications Ltd.	Telecommunication—services
Tata Consultancy Services Ltd.	Computers—software
Tata Elxsi Ltd.	Computers—software
Tata Global Beverages Ltd.	Tea and coffee
Tata Investment Corporation Ltd.	Finance
Tata Motors Ltd.	Automobiles—4 wheelers
Tata Power Co. Ltd.	Power
Tata Sponge Iron Ltd.	Steel and steel products
Tata Steel Ltd.	Steel and steel products
Tech Mahindra Ltd.	Computers—software
Techno Elt & Eng Co. Ltd.	Engineering
Thermax Ltd.	Electrical equipment
Thomas Cook (India) Ltd.	Travel and transport
Tinplate Company of India Ltd.	Steel and steel products
Titan Industries Ltd.	Gems jewellery and watches
Torrent Pharmaceuticals Ltd.	Pharmaceuticals
Torrent Power Ltd.	Power
Tree House Education & Accessories Ltd.	Miscellaneous
Trent Ltd.	Miscellaneous
Tube Investments of India Ltd.	Cycles
Tulip Telecom Ltd.	Telecommunication—services
UCO Bank	Banks
UFLEX Ltd.	Packaging
Ultra Tech Cement Ltd.	Cement and cement products

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Company name	Industry
Unichem Laboratories Ltd.	Pharmaceuticals
Union Bank of India	Banks
Unitech Ltd.	Construction
United Breweries (Holdings) Ltd.	Finance
United Breweries Ltd.	Brew/distilleries
United Phosphorus Ltd.	Pesticides and agrochemicals
United Spirits Ltd.	Brew/distilleries
Unity Infraprojects Ltd.	Construction
Usha Martin Ltd.	Steel and steel products
Uttam Galva Steels Ltd.	Steel and steel products
V.I.P. Industries Ltd.	Plastic and plastic products
VST Industries Ltd.	Cigarettes
Vakrangee Software Ltd.	Computers—software
Varun Shipping Co. Ltd.	Shipping
Venky’s (India) Ltd.	Food and food processing
Vesuvius India Ltd.	Refractories
Videocon Industries Ltd.	Consumer durables
Vijaya Bank	Banks
Voltas Ltd.	Engineering
WABCO India Ltd.	Auto ancillaries
Welspun Corp Ltd.	Steel and steel products
West Coast Paper Mills Ltd.	Paper and paper products
Whirlpool of India Ltd.	Consumer durables
Wipro Ltd.	Computers—software
Wyeth Ltd.	Pharmaceuticals
Yes Bank Ltd.	Banks
Zee Entertainment Enterprises Ltd.	Media and entertainment
Zensar Technologies Ltd.	Computers—software
Zodiac Clothing Co. Ltd.	Textile products
Zydus Wellness Ltd.	Food and food processing
eClerx Services Ltd.	Computers—software

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Chapter 2
Rates of Return on Equity Funds (ROEF)—Corporates' Perspective

Introduction

The most important financial objective of any firm is to maximize the wealth of its owners or ordinary shareholders which, inter-alia, depends on the earnings of the firm on its equity funds, technically referred to as 'return on equity funds (ROEF)' (in common parlance, return on equity (ROE)); the terms ROEF/ROE have been used interchangeably in this text. The returns test is more than a just conventional test of economic efficiency; it is a test of whether the resources are gainfully employed or not and whether the business enterprise is operating competitively or not (Jain et al. 2013).

In the subsequent chapter (Chap. 4), the rates of return earned by equity investors, emanating from the market, for varying holding periods, are calculated and presented for the sample companies. This exercise has been undertaken from the point of view of the equity investors. Returns in the context of the study include both capital gains (returns from market transactions) and dividend payments from the company.

Returns primarily depend on the fundamental strength and financial performance of the underlying company. Given the significance of financial viability of business operations, the objective of this chapter is to assess the financial performance of the sample companies in terms of ROE, with a special focus on comparing returns earned by the corporates during the pre- and post-recession periods. This exercise has been undertaken from the corporates' perspective. In the literature reviewed, there was hardly any literature related to ROE in the context of equity returns (from the firm's perspective), thus, filling the existing gap in the literature.

For better exposition, this chapter has been divided into four sections. Section I provides a brief literature review on the factors that affect ROE and its associated risks. Section II contains the scope and methodology related to the determination of the ROE. Section III presents the computed ROE and its descriptive statistics. Section IV contains the summary of important observations/findings.

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Section I: Literature Review

The literature review focuses on the risk factors/determinants affecting ROE, in particular, and returns, in general. Literature on the recent financial crisis and its impact (if any) on Indian companies has also been presented, albeit, briefly.

Risk Factors/Determinants Affecting ROE

Beaver (1966) contended that a failing firm was costly to the suppliers of capital because the reorganization or liquidation costs consumed a major portion of firm's value. Nerlove (1968) investigated the factors affecting the rate of return on investment in the common stock using the multiple regression technique and concluded that the firm's sales growth was the only important explanatory variable. Auerbach (1979) examined the impact of taxes on the corporate equity policy using a simple dynamic model.

Nwaeze (1997) explored the movements in ROE for electric utilities and manufacturing firms and their effect on profits and share prices. Frank and Jagannathan (1998) examined data from the Hong Kong stock market for the effect of taxes on dividends and capital gains. Stulz (1999) analysed the impact of globalization on the cost of equity capital. In their study, Collins and Kemsley (2000) deduced that capital gains as well as dividend taxes reduced the valuation of the reinvested portion of earnings.

Ferreira and Santa-Clara (2011) studied data from 1927 to 2007 to forecast the components of stock market returns in the USA. The resultant significant components were dividend–price ratio, earnings growth and price-earnings growth. Kandel et al. (2011) studied how a firm's shareholding structure affected its financial and operating performance. Becker et al. (2013) tested the prediction, namely when corporate pay-out was taxed, internal equity (retained earnings) was cheaper than external equity (share issues).

As is evident, literature available around returns on equity in the context of corporate firms is scant. It was thus considered necessary to report ROEF and its analysis, for a large economy like India, in a humble attempt to fill this research gap.

Impact of Recent Financial Crisis on India

Investments have been predominantly financed by domestic savings in India. The Government's fiscal deficit has been high by international standards but is also largely financed internally through a vibrant and well-developed government securities market, and thus, despite large fiscal deficits, macroeconomic and financial stability has been maintained.

The Reserve Bank of India (RBI, India's central bank) in October 2008 stated that India had (at that time) not been seriously affected by the financial crisis, as per the response prepared for the International Monetary Fund (IMF)—Financial Stability Forum (FSF) (Source: RBI Website. http://rbidocs.rbi.org.in/rdocs/Speeches/PDFs/87784.pdf; Economic Surveys of India).

However, with the increasing integration of the Indian economy and its financial markets with the rest of the world, there is recognition that the country does face some downside risks from these international developments. The risks arise mainly from the potential reversal of capital flows on a sustained medium-term basis. As might be expected, the main impact of the global financial turmoil in India emanated from the significant change experienced in the capital account. Total net capital flows fell from US$17.3 billion in April–June 2007 to US$13.2 billion in April–June 2008 (UNCTAD Website 2011).

On the positive side, however, the characteristics of India's external and financial sector management coupled with adequate foreign exchange reserves and the growing underlying strength of the Indian economy reduced the susceptibility of the Indian economy to global turbulence (Source: Reserve Bank of India Website. http://www.rbi.org.in/scripts/WSSViewDetail.aspx?TYPE=Section&PARAM1=2. Accessed on 4 December 2011).

As per the Economic Survey of India of 2010–11, the Indian economy has emerged with remarkable rapidity from the slowdown caused by the global financial crisis of 2007–09. With the growth in 2009–10, estimated at 8 % by the Quick Estimates, released on 31 January 2011, the turnaround has been fast and strong (Source: http://indiabudget.nic.in/. Accessed on 17 November 2011).

Section II: Scope, Data and Methodology

The research methodology adopted in the study to compute ROEF and its descriptive statistics (for corresponding periods) has been delineated hereunder.

Scope

The sample comprises the NSE 500 companies that comprise the top 500 companies listed on the NSE based on their market capitalization. They represented 96.76 % of the free-float market capitalization of the stocks listed on the NSE as on 31 December 2013 (Source: National Stock Exchange (NSE) Website. http://www.nseindia.com/products/content/equities/indices/cnx_500.htm). Hence, virtually, the chosen sample presents a census on equity market returns in India.

The sample is representative in nature as the NSE 500 companies represent all industry groups. The period of the study for this chapter is 2004–2014.

NSE 500 Index Background

The company, Standard & Poor's (S&P), introduced its first stock-based index in 1923 in the USA. Traditionally market-value weighted, the index is now float weighted. That is, S&P now calculates the market capitalizations relevant to the index using only the number of shares (called 'float') available for public trading. This transition was made in two steps, the first on 18 March 2005 and the second on 16 September 2005 (Source: Wikipedia Website. http://en.wikipedia.org/wiki/S%26P_CNX_500).

Its Indian counterpart, the CNX 500 (hereby referred to as NSE 500) is the first broad-based benchmark of the Indian capital market. The Credit Rating Information Services of India Limited (CRISIL) and the NSE together own and manage the index through a joint venture called the India Index Services and Products Limited (IISL) (Investopedia 2013).

Secondary Data and Analysis

Individual Companies and Portfolios

The basic computation of ROEF is for individual companies. The average ROEF for the year has been built up from individual company ROEFs. This method is tedious but has the advantage of not only ensuring greater accuracy but also of providing many more insights. However, the presentation emphasizes the entire portfolio's ROEFs. This has been done in order to provide a benchmark and an over-all picture of returns on equity. Also, most of the serious equity investors, including individuals as well as institutions, have diversified portfolios.

Definition of ROEF

Return on equity (ROEF) is the ratio of net income (after the payment of preference dividends) of a firm (during a year) to its shareholders' equity funds during that year. It is a measure of the profitability of the equity shareholders' investments.

The formula to calculate ROEF for a particular year is given as follows:

$$\mathbf{ROEF} = \left(\mathbf{EAT} - \mathbf{D_p}\right)/\mathbf{Average\ shareholders'\ equity\ funds} \tag{2.1}$$

where

EAT Earnings after taxes,

D_p Preference dividend (if applicable).

Average shareholders' equity funds = the sum of ordinary shareholder's equity funds at the beginning and at the end of the year, divided by 2. It is useful to iterate here that the shareholders' equity funds also include the reserves and surplus (retained through the years) less the accumulated losses (if any).

Initial Public Offering (IPO) Adjustment

In the scenario where the company has made an initial public offering (IPO), in a particular year, its equity amounts would vary substantially when we compare the opening and closing figures. Hence, an adjustment is required in the calculation of the ROEF to reflect this change and also to normalize the otherwise distorted figures.

For example—Company ABC has an equity capital of Rs. 100 crores at the beginning of the year (the financial year beginning in India is April 1). On December 1, nine months from the beginning of the year, the company raises fresh capital through an IPO, thus increasing the equity capital to Rs. 200 crores. It is reasonable to infer that the earnings for that year have been made on an investment of Rs. 100 crores for the first nine months and on Rs. 200 crores for the remaining three months.

By the above calculation, the denominator representing average shareholders' equity would be computed as (100 + 200)/2 = Rs. 150 crores. However, Rs. 200 crores have been employed only towards the last quarter of that year, necessitating an adjustment, to reflect such usage. It is reasonable to assume that, perhaps, the funds were not used for commercial purposes in that financial year since they were made available only towards the end of that year, and it would take time to deploy the funds into projects, straight away. Further, to make such adjustments related to the exact amount of funds deployed till the end of the said financial year is not plausible, due to the lack of appropriate data.

Hence, to aid calculations, the adjustment for the average equity capital values (taking 365 as the number of days in a year) has been made in the following manner:

$$((\text{Capital at the beginning of the year} * 365) + (\text{Additional capital introduced during the year} * (\text{Number of days for which it has been employed})))/365$$

This computational adjustment has been incorporated for all sample companies that issued additional or follow-on equity during the period of the study.

Data Sources and Analysis

The relevant data (secondary) were collected from the Bloomberg® database, for eleven years (2004–2014). Descriptive statistical values/positional values, i.e. mean, standard deviation, variance, coefficient of variation, skewness, kurtosis and quartile values, have been computed for each holding period. The entire set of data has been analysed using Microsoft Excel® spreadsheets and the statistics software SPSS®, namely Statistical Package for Social Sciences. The impact of recession (if any) has been tested through the paired t-test statistic.

The period of the study is of particular importance because of the recession (originating due to the American financial crisis) that impacted the world economy towards the second half of 2008 (Source: UNCTAD investment briefs, investment issues analysis branch of UNCTAD 2009).

Consequently, the study period has been divided into two subphases to ascertain the impact of recession. The five years of 2003–2004 to 2007–2008 denote the prerecession phase (phase 1) and the subsequent six years of 2008–2009 to 2013–2014 denote the post-recession phase (phase 2) for the purpose of this study. It needs to be noted that though the impact of recession was assumed to be felt towards the second half of 2008 (June 2008, cited above), the entire year has been included in the post-recession phase primarily due to two reasons; first, data were available in a consolidated manner (in the balance sheets) and second, it was not feasible to separate it for a particular year (2008) on the basis of when recession actually started impacting a particular data variable (Jain et al. 2013).

Section III: Rates of Return from the Company's Perspective—ROEF

The real owners of the business firm are the ordinary shareholders who bear all the risk and are entitled to all residual profits after all outside claims including preference dividends are met in full. In this section, the rates of return from the company's perspective have been computed. The measure, ROE, has been computed on an annual basis.

ROEF, for the purpose, was calculated separately for each constituent company in the sample, for 10 years, viz., 2003–2013 (years ending 2004–2014). A weighted average of the ROEF thus computed for the 500 constituent companies of the NSE 500 was taken as the average ROEF for that particular year. The unavailability of corporate financial data prior to 2003 is the reason for the non-computation of ROEF for the years prior to 2003.

Table 2.1 presents the average ROEF earned by the constituent companies of the NSE 500 index for the years ending 2004–2014 and their descriptive statistics, viz., mean, standard deviation, variance, coefficient of variation, skewness, kurtosis and

Table 2.1 Mean, standard deviation, coefficient of variation, skewness, kurtosis, median and quartile values related to return on equity funds (ROEF) of sample companies, 2004–2014

Year ending[a]	Number	Mean	Standard deviation	Coefficient of variation (%)	Skewness	Kurtosis	Median	Quartile 1	Quartile 3
2004	424	21.28	15.76	74.06	3.22	18.38	18.88	11.79	26.36
2005	436	21.91	15.36	70.10	1.90	5.33	19.06	11.78	26.82
2006	456	22.58	18.15	80.38	2.60	9.40	17.78	11.91	27.26
2007	465	22.42	16.47	73.46	2.63	11.09	19.51	12.43	27.44
2008	463	20.74	13.51	65.14	1.94	6.63	18.11	12.35	25.79
2009	455	18.44	13.42	72.78	3.02	19.01	16.30	10.21	23.76
2010	469	17.91	12.82	71.58	2.74	16.21	16.46	9.18	23.63
2011	468	17.09	12.60	73.73	3.27	20.84	14.81	9.32	22.26
2012	441	15.72	13.92	88.55	3.98	25.44	13.45	8.33	19.44
2013	467	16.19	13.61	84.06	3.65	24.65	13.89	8.41	20.55
2014	455	15.81	13.73	86.84	2.82	15.37	13.27	6.69	20.54
2004–2014	454	19.10	14.49	76.43	2.89	15.67	16.50	10.22	23.99
Phase 1 (2003–2004 to 2007–2008)	449	21.79	15.85	72.63	2.46	10.17	18.67	12.05	26.73
Phase 2 (2008–2009 to 2013–2014)	459	16.86	13.35	79.59	3.25	20.25	14.70	8.69	21.70

Figures are in percentages
(i) [a]The Indian financial year begins on April 1 and ends on March 31 of the following year. The same holds true for all subsequent tables and notations
(ii) Extreme values of 150 % or more and negative values are excluded

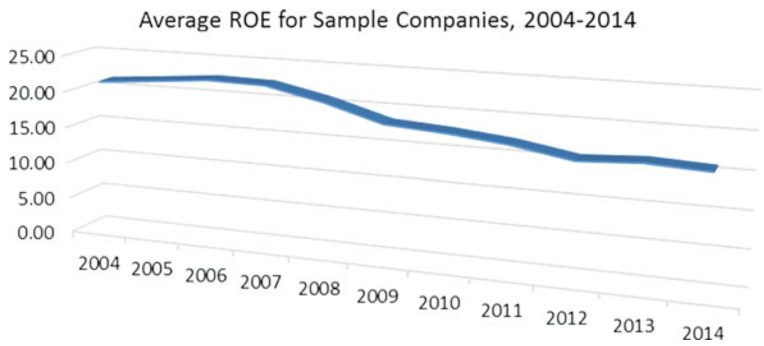


Fig. 2.1 Mean values of ROEF for sample companies, 2004–2014

quartile values. Figure 2.1 denotes the average ROEF for the sample companies pictorially. The frequency distribution is presented in Table 2.2.

Given the current interest rates prevailing in the capital market and social responsibilities the companies have to perform, the average rate of return on equity (ROEF) of 19.10 %, *prima facie,* can be considered satisfactory. Further, this figure is encouraging when compared to the average ROEF of 17 %, reported by Jain et al. (2013) for the BSE 200 companies over the period, 2001–2011. However, recession did impact the ROEF; the decline in the ROE to 16.86 % in phase 2 (post-recession) compared to 21.79 % of phase 1 (prerecession) is statistically significant, as per the paired t-test. It would perhaps be useful to note here that even though there was a drop in the ROE, post-recession, the sample companies were still able to record 16.86 % returns which are comparable with the average returns for the period 2001–2011.

Frequency distribution data further reinforce the above contention (Table 2.2). The percentage of companies having negative ROEF is 8.60 % in 2014. This is in contrast to the findings of an earlier study conducted by the authors on Indian public sector undertakings (PSUs) where 20 % of such companies had negative ROEF. Around one-third of the sample companies lie in the 10–20 % ROEF bracket. One-fifth of the companies reported a ROEF of more than 20 %, an indication of the fundamental robustness of the sample companies and, in turn, the Indian corporate sector.

Paired t-test

	Paired differences					t	df	Significance (2-tailed)
	Mean	Standard deviation	Standard error mean	95 % confidence interval of the difference				
				Lower	Upper			
Phase 1–Phase 2	4.71	1.47	0.66	2.90	6.54	7.19	4	0.002

Table 2.2 Frequency distribution related to ROEF of sample companies, 2004–2014

ROEF (%)	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Less than 0	6.45	5.67	3.51	3.47	4.66	6.85	4.23	5.01	8.28	7.00	8.60
0–10	17.63	18.45	17.73	16.94	15.99	32.23	27.32	27.65	30.10	31.00	33.00
10–20	32.69	31.03	38.14	34.49	36.44	31.24	34.07	38.28	40.80	38.00	33.60
20–30	24.95	26.21	20.00	25.31	24.90	12.70	23.59	20.04	13.73	16.00	14.60
30–40	9.46	7.55	9.28	10.82	9.92	8.87	6.24	5.01	3.23	4.00	5.60
40–50	2.80	4.61	4.54	3.27	2.63	1.81	2.01	1.80	1.21	4.00	3.00
Above 50	5.59	6.08	6.80	5.31	3.64	1.81	2.01	1.60	2.42	1.00	1.80
Total	100	100	100	100	100	100	100	100	100	100	100

Note Total (100) may not tally due to rounding off

Hence, the sample companies appear to be providing adequate returns to their owners adhering to the primary objective of maximizing the wealth of its shareholders. The standard deviation and the coefficient of variation are, however, indicative of the volatility available in the ROEF of the sample companies. This could perhaps be attributable to the varying nature of the sectors represented in the sample.

Positive skewness, through the period of the study, is indicative of larger values of ROEF dominating the sample, which is also supported by the frequency distribution. Approximately, seven-tenths of the sample companies report a ROEF of greater than 10 %, for the entire period of the study, except for the years 2009 and 2012, when this ratio reduced, ostensibly due to the impact of recession occurring in 2008, and the slowdown in the Indian economy in the year 2011, respectively. The average quartile values (10.22 for quartile 1 and 23.99 % for quartile 3) also support the above contention of adequate returns.

Interestingly, a high kurtosis figure is indicative of the ROEF data exhibiting characteristics of a distribution containing high values that exhibit a high degree of clustering around the mean. The behaviour of volatility in returns (in detail), specifically market returns, has been analysed separately, in Chap. 7.

Section IV: Summary

This chapter presents the equity returns, measured through the ROE, for the Indian stock market, represented by the NSE 500 companies.

The returns earned by the sample companies, *prima facie,* appear to be stable and attractive (as an investment choice). Even though the recession in phase 2 did witness a reduction in the computed value of ROEF (a reduction of more than 4 % from 21.79 to 16.86 %), which was statistically significant, the reduced returns were still comparable with the average returns recorded for the period, 2001–2011 (Jain et al. 2013). These findings are notable as they support the RBI's views on the resilience of the Indian economy.

It appears safe to assume that the sample companies, constituting of 96.27 % of the total market capitalization at NSE, continue to be an attractive investment destination for long-term investors who base their investments on fundamentals.

Moreover, it is rather encouraging to note that the returns of the sample companies appear robust when compared to the findings of Gupta and Choudhary (2000). Hence, it appears safe to assume that the success story of the Indian equity market continues, both in terms of the returns and in their increasing market breadth and coverage.

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Chapter 3
Expected Rates of Return

Introduction

Before computing returns earned on equity shares in India (Chap. 4), it would be useful to have an estimate of the expected returns in the Indian stock market. Only after arriving at this required return, it would be useful/insightful first to ascertain whether the rate of return earned by equity investors is adequate or not and second to compare the two sets of returns—expected and actual. Amongst the measures available in the literature to estimate the required return, the capital asset pricing model (CAPM) remains, perhaps, the most utilized. This chapter is devoted to the computation of the estimated required rate of return for the sample companies based on the CAPM. The estimated returns are then compared with the actual market returns posted by the market index, to provide a better understanding of returns, from both the expectations and the actual market index returns' perspectives.

Expected returns are conditional on the fundamental strength and financial performance of the underlying company whose shares the investors purchase. Further, it is also dependent on the company's relative performance vis-à-vis the underlying market. The measure that finds mention in the literature is the firm's beta (β), which is the sensitivity of the security's returns vis-à-vis the market returns. Beta, being a market measure, captures only the systematic or market risk associated with company returns and is an important part of the CAPM, determining expected ROE.

For better exposition, this chapter has been divided into five sections. The first section provides a brief literature review on the factors that affect the CAPM and the studies associated with the model. The second section contains the scope and methodology to compute the estimated returns using the CAPM as well as the risk premium approach. The third section presents the computed expected returns and its comparison with the annual market index returns for the corresponding periods. The fourth section contains the cost of equity computed as a measure of the reward/return for the risk undertaken. Important points are summarized in the fifth section.

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Section I: Literature Review

The literature review focuses on the risk factors/determinants affecting the CAPM in particular and expected returns, in general.

Sharpe (1964), Lintner (1965) and Mossin (1966) developed the capital asset pricing model (CAPM) which measured the performance of assets in terms of returns. They proposed that an asset's risk could be measured by the covariance of the asset's return with the market portfolio return.

Hamada (1969) also analytically proved that if a firm increased its leverage, it directly affected its beta. The study of individual firms' risk as related to their underlying characteristics began with the seminal work of Beaver et al. (1970) who examined the relationship of certain accounting ratios (payout, liquidity and earning variability) to the firm's systematic risk (beta) and reported a strong and significant association between them. Rubinstein (1973) developed a model which included two components of operating risk of a firm—the amount of fixed and variable costs employed in the production technology and the covariability of firm's output with market return. Lev (1974) reported that a negative relationship existed between the level of unit variable cost and systematic risk.

Robichek and Cohn (1974) tested the influence of real economic growth and inflation on the systematic risk (beta) of individual firms. They reported that these macrovariables shed no light on the determinants of the systematic risk and that only for a small number of firms can variations in beta be explained by real growth and inflation. In contrast, however, Hamada (1972) reported that, conditional on the validity of Modigliani and Miller's model, leverage accounted for a substantial portion (21–24 %) of the systematic risk. Logue and Merville (1972), based on a multiple regression technique, attempted to relate financial variables and estimated beta. Assets size, return on assets and financial leverage were found to be significant variables. Along similar lines, Rosenberg and McKibben (1973) analysed the joint influence of the firm's accounting data and its historical stock returns on the systematic and specific risks of its common stocks.

Breen and Lerner (1973) tested the beta variance through independent variables such as the ratio of debt to equity, growth of earnings, stability of earnings growth, size of company, dividend payout ratio and number of shares traded. Melicher (1974) divided risk into systematic or market risk and specific or diversified risk. Black and Scholes (1974) suggested that it was not possible to demonstrate using CAPM that the expected returns on high-yield common stocks differed from the expected returns on low-yield common stocks. Galai and Masulis (1976) linked the firm's equity beta with factors such as level of financial leverage, debt maturity, variation in income, cyclicality, operating leverage and dividends.

Hill and Stone (1980) empirically confirmed that a positive relationship existed between covariability of firm's profitability and market return. Gordon and Bradford (1980) measured the relative valuation of dividends and capital gains in the stock market, using a variant of the CAPM. Hawawini and Michael (1982)

presented an empirical examination of the relationship between the average return and the risk of a comprehensive sample of 200 securities which traded continuously from 1966–1980 on the Brussels Stock Exchange. Based on their findings, they could not reject the hypothesis that the pricing of common stocks on the Brussels Stock Exchange conformed to the CAPM. Cohen et al. (1983) developed an analytical model that indicated how estimates of the market model beta parameter could be biased by friction in the trading process (information, decision and transaction costs) which led to a distinction between observed and 'true' returns.

Mandelker and Rhee (1984) reported a positive relationship between systematic risk and degree of operating leverage. Moreover, a positive relationship was also observed between the degree of financial leverage and systematic risk. Ang et al. (1985) included the degree of operating leverage as an independent variable in the regression model to explain systematic risk, but they failed to produce conclusive results. Handa et al. (1989) examined the behaviour of beta as a function of the return measurement interval and whether the size effect tests were sensitive to beta estimation. Greig (1992) re-examined the Ou and Penman (1989) conclusion that fundamental analysis identified equity values not currently reflected in stock prices and thus systematically predicted abnormal returns.

Koutmos et al. (1994) investigated the degree of volatility persistence and the time-varying behaviour of systematic risk (beta) for ten international stock markets, using the GARCH model. The findings suggested that small capitalization markets exhibited considerably higher volatility persistence than large capitalization markets. Ismail et al. (1994) focused on beta prediction in the extreme risk categories and considered the predictive contribution of accounting information across the risk spectrum. Their results provided evidence that inclusion of accounting risk measures, alone or in combination with market beta, substantially improved beta prediction for high-risk securities, but not for low and medium-risk securities. Fletcher (1997) examined the conditional relationship between beta and returns in the United Kingdom (UK) from 1975–1994. His results supported the findings of Fama and French (1992) and Strong and Xu (1997) as there was no evidence of a significant risk premium on beta, when the unconditional relationship between beta and returns was examined. Brooks et al. (1998) explored the issue of beta instability in the Singaporean stock market over the period 1986–1993. Analysis of the eight-year interval revealed a very high incidence of beta instability, namely at about 40 % of the individual stocks tested.

Allen and Cleary (1998) studied the returns on the Malaysian stock market for the duration 1977–1992 and concluded an inverse relationship between beta and expected returns. They observed that the accounting variables like ratio of book-to-market equity and value of outstanding securities could help in explaining increments in non-systematic risk. Sheu et al. (1998) analysed the cross-sectional relationships between market beta, trading volume and stock returns, on the Taiwan stock exchange from 1976–1996. They reported that market beta and trading volume could be combined to explain the cross section of average returns. Reyes

(1999) analysed the relationship between firm size and time-varying betas of UK stocks and demonstrated that the time-varying coefficient was not statistically significant for both the small and large firm stock indices. Gangemi et al. (2000) analysed Australia's country risk using a country beta market model on the lines of Harvey and Zhou (1993) and Erb et al. (1996a, b). They observed that exchange rates were the only macroeconomic factor that had significant impact on Australia's country beta.

Lau et al. (2002) examined the relationship of stock returns with beta, size, the earnings-to-price (E/P) ratio, the cash flow-to-price ratio, the book-to-market equity ratio and sales growth (SG) by studying the data of the Singapore and Malaysian stock markets for the period 1988–1996. The analysis revealed a negative relationship between size and stock returns and between weighted average annual sales growth and stock returns for the Singapore stock market. For the Malaysian stock market, they noted a negative size effect and a positive E/P effect on stock returns. Elsas et al. (2003) compared the unconditional and conditional test procedure using Monte Carlo simulations and reported that the conditional test significantly supported the relation between beta and return. Turner and Morrell (2003) documented the calculation of the cost of equity capital in a sample of airlines, in comparison with industry-calculated values. They applied the CAPM to airlines stock prices and market indices. Tang and Shum (2003) investigated the conditional relationship between beta and returns in 13 international stock markets for the period 1991–2000. They reported a significant positive relationship between beta and returns in upmarket periods (positive market excess returns), but a significant negative relationship in downmarket periods (negative market excess returns).

Fernandez (2006) estimated the CAPM at different timescales for the Chilean stock market, by resorting to wavelet analysis. He reported evidence in support of the CAPM at a medium-term horizon. Ho et al. (2006) examined empirically the pricing effects of beta, firm size and book-to-market equity, but conditional on market situations, i.e. whether the market was up or down, using Hong Kong equity stock data for cross-sectional regression method. On similar lines, Morelli (2007) examined the role of beta, size and book-to-market equity as competing risk measurements in explaining the cross-sectional returns of UK securities for the period 1980–2000. Cai et al. (2007) focused on the effects of event risk on asset price and modelled investors' optimal portfolio policy in the case of potential event risk in the Chinese stock market and derived a liquidity-based asset pricing model. Iqbal and Brook (2007) investigated the ordinary least square (OLS) beta estimates and different alternative estimators designed to correct the downward bias in the OLS beta, on a sample of 89 stocks from the Karachi stock exchange. They compared the applicability of the two asset pricing models, namely the CAPM and the Fama–French model. It was concluded that although the alternative techniques were successful in bias reduction, the results from the improved estimators did not appear to be different from the OLS benchmark.

Hooper et al. (2008) compared a series of competing models to forecast beta in order to reduce forecast error. It was reported that an autoregressive model with

two lags produced the lowest or close to the lowest error for quarterly stock beta forecasts. Lally and Swidler (2008) investigated the relationship between the market weight of a single stock and the betas of that stock as well as of the residual portfolio. Adrian and Franzoni (2009) modelled conditional betas using the Kalman filter as it focused on low-frequency variation in betas. Manjunatha and Mallikarjunappa (2009) attempted to test the validity of the combination effect of the two-parameter CAPM to determine the security/portfolio returns. Hearn (2010) contrasted the performance of the CAPM, augmented by size and liquidity factors, with its time-varying coefficient counterpart, using a unique market universe compiled from constituent stocks of blue-chip indices—BSE-100 (India), KSE-30 (Pakistan), DSE-20 (Bangladesh) and Dow Jones Titans (Sri Lanka). The evidence suggested that substantial size and liquidity effects were present in all markets with the exception of Sri Lanka. Guermat and Freeman (2010) introduced a new, more robust, net beta test which shared a number of characteristics with conditional beta tests. They demonstrated theoretically, by simulation and using market data, that the net beta estimators had lower standard errors than those generated by the standard Fama–MacBeth test.

Ray (2010) analysed the stability of beta for the Indian market for a ten year period, 1999–2009. The monthly returns data of 30 selected stocks were considered for examining the stability of beta in different market phases. Masih et al. (2010) estimated the systematic risk ‘beta’ at different timescales in the context of the emerging Gulf Cooperation Council (GCC) equity markets by applying a relatively new approach (known as wavelet analysis). They reported that value at risk (VaR) measured at different timescales suggested that risk tended to be concentrated more at the higher frequencies (lower timescales) of the data. Durand and Ng (2011) applied the methodology proposed by Pettengil et al. (1995) on eleven Pacific Basin emerging markets. Their study supported the beta-based tests. Morelli (2011) examined the role of beta in explaining security returns in the UK stock market over the period of 1980–2006 by applying a joint conditionality and incorporating various versions of ARCH models to estimate time-varying betas. Majumder (2011) developed a model which incorporated market sentiments in the domain of the standard rational model of asset pricing.

Da et al. (2012) evaluated the empirical evidence against the standard CAPM from the perspective that it could nevertheless provide a reasonable estimate of a project’s cost of capital, provided that any embedded real options associated with the project were evaluated separately for capital budgeting purposes. Hasan et al. (2012) investigated the risk-return trade-off within the CAPM structure for the Dhaka stock exchange. Manjunatha and Mallikarjunappa (2012) examined the validity of the five parameter models (the combination of five variables, viz. beta (β), size, E/P, book value/market value (BV/MV) and market risk premium ($R_m - R_f$) on the Indian stock returns using cross-sectional regression. The results reported that the combination of β, size, E/P, BV/MV and ($R_m - R_f$) variables explained the variation in security returns.

Section II: Scope, Data and Methodology

The research methodology adopted in the study to compute the estimated returns (using the CAPM) and its comparison with market returns (for corresponding periods) has been delineated hereunder. Further, the cost of equity so computed would reflect the expected rates of return on equity shares. The methodology adopted to compute the same is also provided in this section.

Scope

The NSE 500 index of India comprises of the top 500 companies listed on the NSE based on their market capitalization and is the chosen sample for this study. The total traded value for the last six months ending December 2013 of all index constituents was approximately 97.01 % of the traded value of all stocks on NSE (Source: National Stock Exchange (NSE 2014) Website. http://www.nseindia.com/products/content/equities/indices/cnx_500.htm). Hence, virtually, the chosen sample presents a census on equity market returns in India.

The date of sample selection was 11 March 2013. The period of the study for this chapter is 2001–2014. This universe was chosen for the convenience of access to the data required and also on the assumption that it would be an accurate representation of the equity returns in India.

Further, the index returns for the NSE 500 index were taken as the proxy for market returns in the CAPM.

NSE 500 Index Background

The company Standard & Poor's (S&P) introduced its first stock-based index in 1923 in the United States of America (USA). The index had traditionally been market-value weighted; that is, the movements in the prices of the stocks with the higher market capitalizations (the share price times the number of shares outstanding) had a greater effect on the index than the companies with the smaller market capitalizations. However, the index is now float weighted (Source: Wikipedia Website. http://en.wikipedia.org/wiki/S%26P_CNX_500).

The CNX 500 is the Indian counterpart (hereby referred to as NSE 500). CNX stands for the Credit Rating Information Services of India Limited (CRISIL) and the NSE. These two bodies own and manage the index through a joint venture called the India Index Services and Products Limited (IISL) (Investopedia 2013).

The NSE 500 companies are disaggregated into 72 industry indices. Industry weightages in the index reflect the industry weightages in the market. (Source: National Stock Exchange (NSE 2014) Website. http://www.nseindia.com/products/content/equities/indices/cnx_500.htm).

Secondary Data and Analysis

The CAPM Model

The CAPM model uses the following computation:

$$E(R_i) = R_f + \beta_i(E(R_m) - R_f) \tag{3.1}$$

where

- $E(R_i)$ is the expected return on the security i;
- R_f is the risk-free rate of interest, such as interest arising from government bonds;
- β_i (the *beta*) is the sensitivity of the expected excess asset returns to the expected excess

$$\beta_i = \frac{\text{Cov}(R_i, R_m)}{\text{Var}(R_m)} \tag{3.2}$$

- market returns, or also;
- $E(R_m)$ is the expected return of the market.

Deployment of the CAPM

In deploying the CAPM, the following methodology has been adopted:

- The risk-free return for the 364-day treasury bills has been taken as the proxy for risk-free return,
- The annual NSE index returns have been taken as the proxy for market returns, and
- The weighted beta for the sample has been taken as the beta for the model. The market capitalization of the constituent companies in the sample has been taken as the weight.

Cost of Equity (Ke) or Expected Rates of Return on Equity Shares

In section "Expected Rates of Return—Cost of Equity", the cost of equity has been computed for the sample companies, as a measure of the return expected for the risk undertaken. The formula derived through the theory proposed by Ross (1976) and used for the same is as follows:

$$k_e = r_f + b + f \tag{3.3}$$

where

r_f = Risk-free rate of return
b = Business risk premium
f = Financial risk premium

Whilst the degree of operating leverage (DOL) measures the operating risk, the degree of financial leverage (DFL) measures the financial risk. Therefore, in an attempt to compute the cost of equity through the above-stated equation, the DOL and DFL of the sample companies were computed for the period, 2001–2014.

DOL and DFL

Degree of operating leverage is calculated as percentage change in earnings before interest and taxes (EBIT) divided by percentage change in net sales. Degree of financial leverage is calculated as percentage change in earnings per share (EPS) divided by percentage change in EBIT.

Further, it may be noted that the negative values have been excluded from analysis as they do not serve the intended purpose of measuring risk on the one hand and would have caused distortion in determination of average values on the other. To have better and more representative data on the subject, we have also excluded extreme values (exceeding 5) of DOL/DFL.

Data Sources and Analysis

The relevant data (secondary) were collected from the Bloomberg® database, for fourteen years (2001–2014), and from the Website of the Reserve Bank of India (RBI). Descriptive statistical values/positional values, i.e. mean, standard deviation, variance, coefficient of variation, minimum, maximum, skewness, kurtosis and quartile values, have been computed for each year. The entire set of data has been analysed using Microsoft Excel® spreadsheets and the statistics software SPSS®, namely Statistical Package for Social Sciences.

Section III: Expected Rates of Return Based on Capm

In this section, the expected rates of return for the sample companies have been computed. The model, CAPM, has been used to compute expected returns on an annual basis, in order to facilitate comparison with annual market index returns for the corresponding periods.

The unavailability of corporate financial data prior to 2001 is the reason for the non-computation of expected returns for the years prior to 2001. Hence, comparison between the market index returns and the expected returns would be made for the period 2001–2014.

Table 3.1 presents the expected returns for the years 2001–2014 and the corresponding market index returns. To enable better comparison, Table 3.2 presents the computed mean, standard deviation, variance, coefficient of variation, minimum, maximum, skewness, kurtosis and quartile values of both the expected and the market index returns for the period.

As is evident from Table 3.1, the expected returns and the actual market index returns appear to follow the same pattern. Both the expected actual returns dropped drastically in 2009 and became negative, perhaps as a result of the recession that originated in the USA in 2008. Hence, the CAPM model appears to be an appropriate model to estimate expected returns in the Indian stock market, represented

Table 3.1 Expected returns for the sample companies and their comparison with market index returns for the period, 2001–2014 (figures are in percentage)

Year	Average expected return	Index returns
2001	−14.26	−42.99
2002	5.29	2.82
2003	−2.72	−10.78
2004	59.86	106.39
2005	13.14	18.89
2006	35.56	61.21
2007	8.09	8.07
2008	17.77	21.64
2009	−22.55	−39.89
2010	66.29	85.54
2011	6.89	6.47
2012	−5.53	−9.01
2013	5.64	5.13
2014	15.09	17.00

Table 3.2 Mean, standard deviation, variance, coefficient of variation, minimum, maximum, skewness, kurtosis and quartile values of expected and market index returns, 2001–2014

Statistic	Expected returns	Index returns
Mean returns	13.47	16.46
Standard deviation	25.33	42.50
Variance	641.63	1806.16
Coefficient of variation	188.05	258.20
Minimum returns	−22.55	−42.99
Maximum returns	66.29	106.39
Skewness	0.98	0.84
Kurtosis	0.66	0.50
Lower quartile	−3.42	−9.45
Upper quartile	22.22	31.53

through the sample companies. Table 3.2, in this regard, is perhaps more revealing. The average expected returns for the period are 13.47 % compared to average market index returns of 16.46 %. The standard deviations, coefficient of variation and variance figures are also similar, indicating that expected returns mirror the volatility present in the market. However, expectedly, the market index presents a volatility that is substantially higher than the expectations. The skewness and kurtosis figures are low indicating returns lying closer to the previous and subsequent return values. A paired t-test was administered to analyse whether the average expected returns were statistically different from market returns. As is evident from the t-statistic, there is no statistically significant difference between the expected and the market index returns.

Paired t-test

	Paired differences					t	df	Significance (2-tailed)
	Mean	Standard deviation	Standard error mean	95 % confidence interval of the difference				
				Lower	Upper			
Expected returns—index returns	2.99	18.25	4.88	−13.53	7.54	−0.61	13	0.55

The Pearson correlation coefficient between expected and actual market index returns was 0.98, further substantiating that the CAPM is an appropriate tool to forecast actual market index returns. When comparing this data with the returns computed for varying holding periods (Chap. 4), it is safe to postulate that the Indian stock market provides volatility and returns to the technical (short-term) investors and also allows returns over the long run to the fundamental (long-term) investors. Buy-and-hold strategy returns over the long term mirror the computed ROEF (Chap. 2). However, in the presence of volatility in the short run which increases the risk, it would perhaps be wiser to invest in the long run in the Indian stock market. Such a strategy should result in relatively less risky and more stable returns vis-à-vis the short-run returns.

It is important to emphasize that expected returns which are computed, based on the CAPM model, are taken into consideration only the systematic risk of the security under consideration. Since systematic risk is a function of the covariance of the security's returns with the variance in market returns, the returns may be negative in response to the market (as is evident from Table 3.1).

However, the cost of equity (returns expected by the equity providers) for a company can never be negative. Hence, simply basing our analysis on expected returns based on the CAPM model would be incomplete. There is a requirement to compute the returns expected by the equity providers based on the risk undertaken by investing in that particular security. The same is undertaken in Sect. 'Expected Rates of Return—Cost of Equity'.

Section IV: Expected Rates of Return—Cost of Equity

Would an investor in India be satisfied with 8–10 % return on equity investment? The answer is likely to be in the negative; this rate of return can be easily earned by investing in safe instruments such as the public provident fund (PPF), the Indira Vikas Patra (IVP), long-term deposit with commercial banks and so on (with virtually full safety of investments). Obviously, the investors would like to be compensated for the extra risk they are assuming by investing in the equity shares of a corporate enterprise.

A corporate firm is subject to business risk (*b*). This apart, there is a variability in the rates of return available to equity holders (as they are the last claimants on dividends as well as repayment of capital in the event of liquidation of a company), known as financial risk (*f*). As a compensation to the higher risk exposure, equity holders expect a higher return, and therefore, higher cost is associated with them. In brief, the cost of equity (k_e) is as follows:

$$k_e = r_f + b + f \tag{3.4}$$

The business risk is measured through a ratio called the degree of operating leverage (DOL), and the financial risk is measured through the degree of financial leverage (DFL). Therefore, in an attempt to compute the cost of equity through the above-stated equation, the DOL and DFL of the constituent companies have been computed for the period 2001–2014.

Relevant data pertaining to mean, standard deviation, coefficient of variation, skewness, kurtosis, median and quartile values of DOL and DFL of the sample companies are contained in Table 3.3. Frequency distribution pertaining to DOL and DFL of the sample companies is presented in Table 3.4. Figures 3.1 and 3.2 present the average DOL and DFL, graphically.

The average DOL for the sample companies is 1.46 and has remained stable through phases 1 and 2. The paired t-test does not indicate any statistically significant changes in mean values over the two phases indicating stable operating risk conditions. Similarly, average financial leverage in the sample companies has been 1.32. Thus, the sample companies have managed their combined risk within controllable limits, an indication of sound risk management practices.

The skewness and kurtosis figures indicate that only few companies reported large values of the two measures of risk indicating low-risk statistics (for sizeable corporates). As per the frequency distribution, nearly 60 % of sample companies have low DOL of less than 1.5 (Table 3.4) in 2014 compared to the reverse in 2001. Hence, the risk in the sample companies appears to have reduced through the period of the study (2001–2014). DFL also presents similar properties. The lowering of risk is further emphasized through the values of both DOL and DFL being above 5 in 2001 for more than 30 % of the sample companies, which has reduced substantially over the period of the study. These findings are similar to the findings on

Table 3.3 Mean, standard deviation, coefficient of variation, skewness, kurtosis, median and quartile values of degree of operating leverage (DOL) and degree of financial leverage (DFL) of sample companies, 2001–2014

Year ending	Leverage	Number	Mean	Standard deviation	Coefficient of variation (%)	Skewness	Kurtosis	Median	Quartile 1	Quartile 3
2001	DOL	237	1.53	1.08	70.59	1.14	0.87	1.26	0.78	2.03
	DFL	255	1.53	1.10	71.90	0.15	0.82	1.18	0.81	2.01
2002	DOL	237	1.53	1.08	70.59	1.14	0.87	1.26	0.78	2.03
	DFL	256	1.52	1.10	72.37	0.15	0.81	1.18	0.80	2.01
2003	DOL	257	1.43	1.16	81.12	1.18	0.77	1.07	0.60	1.98
	DFL	256	1.56	1.07	68.59	0.15	1.35	1.23	0.91	2.01
2004	DOL	285	1.46	1.08	73.97	1.12	0.75	1.21	0.69	1.96
	DFL	310	1.49	0.99	66.44	0.14	1.34	1.23	0.86	1.84
2005	DOL	312	1.49	1.08	72.48	1.14	0.87	1.18	0.71	1.96
	DFL	341	1.30	0.87	66.92	0.13	4.85	1.10	0.81	1.53
2006	DOL	329	1.63	1.15	70.55	1.12	0.48	1.25	0.82	2.17
	DFL	373	1.18	0.81	68.64	0.13	4.91	1.04	0.73	1.34
2007	DOL	367	1.50	1.00	66.67	1.33	1.51	1.21	0.85	1.92
	DFL	414	1.08	0.72	66.67	0.12	4.62	0.98	0.65	1.28
2008	DOL	368	1.45	0.92	63.45	1.30	1.67	1.20	0.88	1.77
	DFL	425	1.13	0.76	67.26	0.12	5.41	1.00	0.72	1.23
2009	DOL	310	1.34	0.96	71.64	1.27	1.29	1.07	0.69	1.69
	DFL	410	1.25	0.82	65.60	0.12	3.75	1.08	0.84	1.43
2010	DOL	311	1.63	1.12	68.71	0.87	−0.03	1.26	0.79	2.31
	DFL	382	1.37	0.94	68.61	0.13	2.64	1.11	0.82	1.75
2011	DOL	351	1.27	0.94	74.02	1.51	2.34	1.00	0.70	1.63
	DFL	417	1.28	0.78	60.94	0.12	3.79	1.09	0.83	1.54

(continued)

Table 3.3 (continued)

Year ending	Leverage	Number	Mean	Standard deviation	Coefficient of variation (%)	Skewness	Kurtosis	Median	Quartile 1	Quartile 3
2012	DOL	329	1.19	0.84	70.59	1.49	2.88	1.03	0.66	1.43
	DFL	396	1.15	0.83	72.17	0.12	4.54	1.01	0.69	1.39
2013	DOL	310	1.37	0.95	69.34	1.41	2.00	1.11	0.78	1.68
	DFL	390	1.32	0.86	65.15	0.12	3.06	1.11	0.85	1.56
2014	DOL	305	1.64	1.10	67.07	0.98	0.40	1.34	0.90	2.22
	DFL	379	1.31	0.87	66.41	0.13	2.64	1.09	0.82	1.54
2001–2014	DOL	308	1.46	1.03	70.77	1.21	1.19	1.18	0.76	1.91
	DFL	356	1.32	0.90	67.79	0.13	3.22	1.10	0.79	1.61
Phase 1 (2000–2001 to 2007–2008)	DOL	299	1.50	1.07	71.18	1.18	0.97	1.21	0.76	1.98
	DFL	329	1.35	0.93	68.60	0.14	3.01	1.12	0.79	1.66
Phase 2 (2008–2009 to 2013–2014)	DOL	319	1.41	0.99	70.23	1.26	1.48	1.14	0.75	1.83
	DFL	396	1.28	0.85	66.48	0.12	3.40	1.08	0.81	1.54

Table 3.4 Frequency distribution pertaining to the degree of operating leverage (DOL) and degree of financial leverage (DFL) of sample companies, 2001–2014 (figures are in percentages)

Leverage	Range	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
DOL	Less than 0	19.60	20.00	18.40	18.80	19.20	17.40	12.60	17.00	27.80	22.60	23.00	27.20	26.00	27.60
DFL		15.20	15.00	17.80	14.80	17.60	14.40	8.40	11.60	13.40	15.80	12.60	17.60	16.60	17.60
DOL	0.0–0.5	7.00	7.00	11.60	9.40	9.00	7.00	6.40	7.40	8.40	8.00	8.80	10.80	8.80	7.60
DFL		8.40	8.00	6.40	7.80	7.40	10.60	13.80	12.40	10.80	8.20	8.40	14.00	8.00	8.20
DOL	0.5–1.0	10.40	10.00	12.00	14.00	15.60	16.00	21.00	18.60	18.80	14.00	26.40	20.80	15.20	12.20
DFL		10.20	10.00	9.40	13.60	21.20	22.80	29.60	29.80	23.60	20.20	24.60	24.40	23.00	23.80
DOL	1.0–1.5	11.60	11.00	9.40	12.80	13.60	14.80	19.60	21.40	16.00	13.40	16.00	19.00	19.40	14.80
DFL		13.40	13.00	14.60	17.40	22.60	27.00	26.00	28.80	28.60	23.80	29.20	24.80	26.60	24.60
DOL	1.5–2.0	6.60	6.00	6.00	7.20	9.80	9.60	10.40	12.40	7.00	8.60	6.20	5.20	7.00	9.20
DFL		7.20	7.00	8.80	9.40	8.60	6.80	5.20	4.60	8.00	9.80	9.80	8.00	9.40	7.20
DOL	2.0–5.0	12.40	13.00	12.80	14.40	14.40	18.80	16.40	14.60	11.80	19.00	12.80	10.20	11.80	18.00
DFL		13.00	13.00	13.00	13.60	9.00	8.60	8.80	9.60	10.80	14.60	11.20	8.20	11.40	12.40
DOL	Above 5.0	32.80	32.80	30.00	24.00	18.20	16.60	13.80	9.20	10.00	15.00	6.60	6.80	11.80	11.20
DFL		33.40	33.40	30.80	23.00	14.00	10.80	8.60	3.20	4.40	7.60	3.80	3.00	5.20	6.40
	Total (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	100

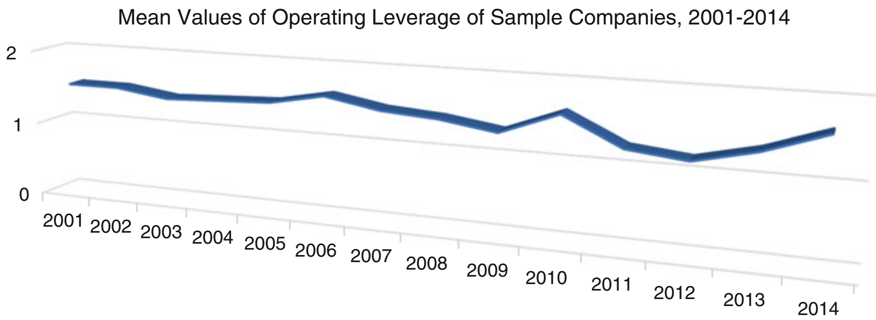


Fig. 3.1 Mean values of operating leverage of the sample companies, 2001–2014

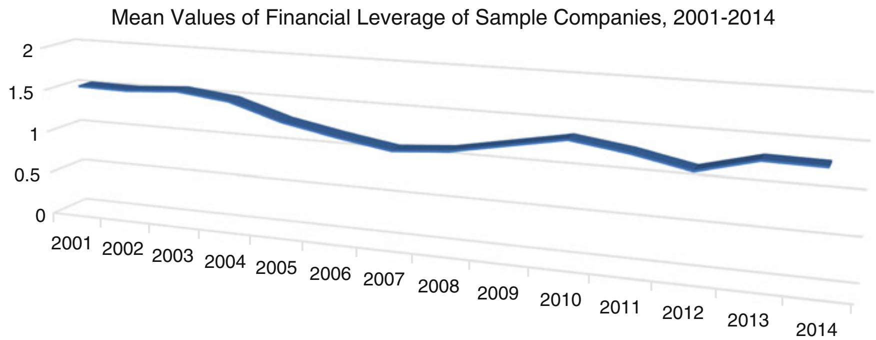


Fig. 3.2 Mean values of financial leverage of the sample companies, 2001–2014

public sector enterprises over a period of 1991–2003, reporting a DOL of 1.18 and a DFL of 1.09, respectively.

Paired t-test

		Paired differences					t	df	Significance (2-tailed)
		Mean	Standard deviation	Standard error mean	Lower	Upper			
DOL	Phase 1—Phase 2	0.11	0.14	0.06	−0.04	0.25	1.19	5	0.12
DFL	Phase 1—Phase 2	0.15	0.19	0.78	−0.05	0.35	2.00	5	0.11

In order to arrive at an approximation of the cost of equity, the values of DOL and DFL were assigned a probable risk premium rate, in percentage terms, as provided in Table 3.5. For example, a rate of 1 % was assigned to a DOL/DFL of even less than 0, as the investment in the shares of a corporate enterprise is by

nature more risky than a government debt security; business and financial risk notwithstanding a shareholder only has residual claim over the net earnings of a company, and even that can be retained by the company.

Based on the average DOL and DFL values for each year, the following risk premia (in percentage terms) provided in Table 3.5 have been assigned to the corresponding periods, in order to arrive at the cost of equity (Table 3.6).

Table 3.5 Assignment of risk premium rate for DOL and DFL

Leverage	Range	Risk premium assigned (rate per cent)
DOL	Less than 0	1.00
DFL		1.00
DOL	0.0–0.5	1.50
DFL		1.50
DOL	0.5–1.0	2.00
DFL		2.00
DOL	1.0–1.5	3.00
DFL		3.00
DOL	1.5–2.0	4.00
DFL		4.00
DOL	2.0–5.0	5.00
DFL		5.00
DOL	Above 5.0	10.00
DFL		10.00

Table 3.6 Cost of equity based on the risk premium approach

Year ending	Risk-free rate (in per cent)	Business risk (DOL)	Business risk premium (in rate per cent)	Financial risk (DFL)	Financial risk premium (in rate per cent)	Cost of equity (in rate per cent)
2001	9.44	1.53	4.00	1.53	4.00	17.44
2002	7.34	1.53	4.00	1.52	4.00	15.34
2003	5.71	1.43	3.00	1.56	4.00	12.71
2004	6.11	1.46	3.00	1.49	3.00	12.11
2005	7.34	1.49	3.00	1.30	3.00	13.34
2006	7.89	1.63	4.00	1.18	3.00	14.89
2007	8.12	1.50	4.00	1.08	3.00	15.12
2008	7.69	1.45	3.00	1.13	3.00	13.69
2009	7.23	1.34	3.00	1.25	3.00	13.23
2010	7.92	1.63	4.00	1.37	3.00	14.92
2011	8.52	1.27	3.00	1.28	3.00	14.52
2012	8.40	1.19	3.00	1.15	3.00	14.40
2013	8.36	1.37	3.00	1.32	3.00	14.36
2014	8.41	1.64	2.50	1.31	3.00	13.91
2001–2014	7.75	1.46	3.00	1.32	3.00	13.75

Thus, the cost of equity is likely to be less than/nearly twice the risk-free rate prevalent in the market for a typical corporate firm. The average cost of equity over the period of the study (2001–2014) for the sample companies has been nearly 14 %, assuming the average risk-free rate to be 7.75 %. The same is substantiated by the average expected returns of 13.47 % computed via the CAPM. Obviously, the individual company's cost of equity would be dependent on its relative risk complexion vis-à-vis the other securities available in the market.

Section V: Summary

This chapter presents the expected equity returns, measured through the CAPM and the risk premium approach, for the Indian stock market, represented by the NSE 500 companies.

The CAPM appears to be an appropriate model to calculate expected returns emanating from the Indian stock market. The average expected returns are 13.47 %, and the average market index returns are 16.46 %, indicative of the market being able to perform better than the expected returns by the technical investors.

The average cost of equity (ke) for the sample companies based on the risk premium approach, over the period of the study, is also around 14 % (13.75 %). The average ROE computed in Chap. 2 is 19.20 %, indicative of the fundamental strength of the sample companies in earning returns which are above the expectations.

Hence, prima facie, the sample companies, constituting 96.27 % of the total market capitalization at NSE, continue to be an attractive investment destination for both fundamental (long-term) and technical (short-term traders) investors. However, in the presence of volatility in the short run which increases the risk, it would perhaps be prudent to invest in the long run in the Indian stock market. Such a strategy should result in relatively less risky and more stable returns vis-à-vis the short-run returns.

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Chapter 4
Rates of Return—Investors' Perspective

Introduction

An investor who purchases the equity shares of a company has two sources of income from such an investment. The first is dividends—the sharing of the after-tax profits of a company with its owners—and the second is capital appreciation. Typically, for high-growth companies (like many such companies in the sample comprising the top 500 companies listed at the National Stock Exchange (NSE)), dividend income is not a favoured option. The reason is that these companies prefer to retain their earnings in order to finance their growth needs. This is the primary reason why dividend yields in India have been low (Jain et al. 2013).

The second and more important source of income for the investor from equity investment is the potential of earning capital gains. Even if a company does not pay dividends or pays inadequate dividends, the demand for its shares in the open market (a stock exchange) may remain unchanged (in fact, may sometimes increase) due to its strong underlying fundamentals and earnings growth potential. This would result in an increase in the market price of its shares, allowing the investor who had bought the shares at a relatively lower price to sell them at the higher price and book a profit (capital gains) on the sale.

This chapter assesses at equity returns from the sample companies from the investors' point of view, factoring both sources of income—viz., dividends and capital gains. The sample for the study comprises the NSE 500 companies and the period, under study, is spread over the past two decades (1993–2014). It is pertinent to note here that a study on equity returns for the period 1985–1999 was conducted by Gupta and Choudhury (2000). Comparisons with this study have been made, wherever appropriate, to provide the readers with a larger perspective on the evolution and behaviour of equity returns in India, for a period of nearly three decades (1985–2014). Further, a brief comparison with the alternative investment choice, viz., debt instruments, has also been made for a more complete analysis of returns from the investors' point of view.

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For better exposition, the chapter is divided into five sections. Section 1 contains the literature review. Section 2 details the methodology adopted. Section 3 presents the period-wise total returns for varying holding durations. Section 4 discusses the overall characteristics of the returns for the period studied along with the comparison with returns on debt instruments. Section 5 contains the concluding observations.

Section I: Literature Review

For better comprehension, the literature reviewed has been split into the factors affecting returns and the behaviour of share prices.

Factors Affecting Returns

Gordon (1959) attempted to explain the variation in the price of the stock by developing a model, enumerating the parameters that investors considered and the weights they accorded to these parameters in buying common stocks.

Miller and Modigliani (1961) documented that the effect of a firm's dividend policy on the current price of its shares is important not only to the corporate managers but also to the investors planning portfolios and further to the economists seeking to understand and appraise the functioning of the capital markets. They stated that from the perspective of the dividend policy, what counts is the imperfection that might lead an investor to have a systematic preference between a dollar of current dividends and a dollar of capital gains.

Black and Scholes (1974) suggested that it was not possible to demonstrate, using the capital asset pricing model (CAPM), that the expected returns on high-yield common stocks differed from the expected returns on low-yield common stocks either before or after taxes. They contended that the best method for testing the effects of dividend policy on stock prices was to test the effects of dividend yields on stock returns.

Ben-Zion and Shalit (1975) determined that the dividend record of any firm could be used to measure the firm's success in maintaining its target dividend policy, its underlying earnings stability and its duration. Gordon (1959) measured the relative valuation of dividends and capital gains in the stock market, using a variant of the CAPM. They observed that dividends were not valued differently from capital gains.

Handa et al. (1989) examined the behaviour of beta as a function of the return measurement interval and whether the size-effect tests were sensitive to the estimation of beta. It was observed that the betas of high-risk securities increased with the return interval, whereas the betas of low-risk securities decreased with the return interval. Their results suggested that only the annual betas explained the return variation.

The findings of the study of Bernheim and Wantz (1995) implied that an increase in the dividend taxation increased the share price response. De Angelo et al. (1996) studied the signalling content of decisions made by the managers regarding dividends, focusing on the companies whose annual earnings declined after nine or more consecutive years of growth. Their results indicated that the managers' dividend decisions in the year of the earnings downturn were not useful signals of the future prospects of earnings.

Benartzi et al. (1997) analysed whether the information content of a dividend announcement had an impact on the future earnings. Their results yielded limited support for this relationship. Penman and Sougiannis (1997) demonstrated empirically that earnings estimated according to generally accepted accounting principles (GAAP) had properties which could be used to serve as a substitute for dividends in equity valuation analysis.

Francis et al. (2000) compared the reliability of the value estimates from three models—the discounted dividend model, the discounted free cash model and the discounted abnormal earnings (AE) model. The five-year forecasts (1989–1993) for 3000 firms were used for the study. It was observed that the discounted AE model was more accurate and reliable than the other two models. The results also suggested that the AE values estimated explained more of the variation in market prices.

In their study, Collin and Kemsley (2000) concluded that capital gains and dividend taxes both reduced the valuation of the reinvested portion of earnings. Pethe and Karnik (2000) studied the inter-relationships between stock prices and macroeconomic variables. They considered the exchange rate of rupee versus dollar, prime lending rate, narrow and broad money supply, and the index of industrial production. They did not observe a stable and long-term relationship between the stock prices and the macroeconomic variables.

Gopinath et al. (2010) provided evidence based on the transactions data of a sample of the National Association of Securities Dealers Automated Quotations Systems (NASDAQ) stocks indicating that the trades of large firms were related to the proxies of market-wide and firm-specific information. For large firms, an increase in the number of trades seemed to have a beneficial effect on the liquidity, measured by the bid-ask spreads.

Harris et al. (2001) supported the hypothesis that at least a substantial portion of the dividend tax was capitalized in equity values. They stated this with respect to the signalling hypothesis; for example, the higher were the expected future earnings, the greater was the amount of expected internal funds available to finance investment (assuming other parameters were kept constant) and the more likely was a firm to pay dividends.

Grullon and Michaely (2002) report that firms have gradually substituted share repurchases for dividends. According to Goyal and Welch (2003), firms that cut their dividends and did not repurchase experienced a significantly negative price drop to the announced dividend cut. When investors perceived that dividends were being replaced by repurchases, they viewed the reduction in dividends as less negative.

Dichev and Yu (2011) used the dollar-weighted returns (a form of internal rate of return, IRR) to assess the properties of actual investor returns on the hedge funds

and compared them to the buy-and-hold fund returns, holding the belief that the returns of the hedge fund investors depended not only on the returns of the funds they held but also on the timing and magnitude of the capital flows in and out of these funds. Their major finding was that the annualized dollar-weighted returns were 3–7 % lower than the corresponding buy-and-hold fund returns.

Alti and Sulaeman (2011) reported that the firms issued new shares when the high stock returns coincided with strong demand from the institutional investors.

Behaviour of Share Prices

Beaver (1966) argued that a company on the verge of bankruptcy was costly to the suppliers of capital because reorganization or liquidation costs consumed a major portion of the firm's value. Apart from the financial ratios being a good predictor to analyse a firm's probability of failure, he also concluded that the other important tool to predict the failure of a firm were the changes in the market price of the stock.

Praetz (1972) presented both theoretical and empirical evidence about a probability distribution which described the behaviour of share price changes. Osborne's Brownian motion theory of share price changes was modified to account for the changing variance in prices in the share market. This produced a scaled t-distribution which was a significant fit to a series of share price indices. Schipper and Smith (1986) investigated the share price reactions of the parent firms to the announcements of public offerings of the stock of wholly owned subsidiaries. The average abnormal gains associated with 'equity carve-out' announcements contrasted with the average abnormal losses documented upon the announcements of public offerings of the parent entity's equity.

Greig (1992) re-examined Ou and Penman (1989)'s conclusion that fundamental analysis identified the equity values not currently reflected in the stock prices, and thus, systematically predicted the abnormal returns. Their fundamental summary measure, Pr, the estimated probability of an earnings increase, was used as a proxy for the firm size and the CAPM risk. After controlling cross-sectional differences in CAPM beta and firm size, no significant incremental predictive ability was attributable to Pr. Further, Holthausen and Larcker (1992) examined the profitability of a trading strategy which was based on a logit model designed to predict the sign of the subsequent twelve-month excess returns from accounting ratios (Ou and Penman 1989). Over the 1978–1988 period, the average annual excess returns produced by the trading strategy ranged between 4.30 and 9.50 %, depending on the specific measure of excess returns and the weighting scheme involved. However, their strategy did not earn excess returns.

Lynch and Mendenhall (1997) analysed price and volume data for firms added to and deleted from the S&P 500 index since 1989 for a distinct pattern of stock price movements. The price reversal after addition and deletion strongly suggested the existence of temporary price effects, caused by index fund trading associated with S&P 500 composition changes. Further, Blume et al. (1989) observed that the price

of a typical stock that was added to or deleted from the index and required maximum trading did not adjust fully, immediately after the announcement nor had it fully adjusted by the opening on the change date. This finding suggested that an indexer could enhance the realized returns by buying at the opening date, following the announcement rather than waiting until the close on the change date.

Ex-dividend day share price adjustment in the USA and elsewhere has been commonly interpreted as reflecting taxes. To explore this further, Frank and Jagannathan (1998) examined data from the Hong Kong stock market, where neither the dividends nor the capital gains were taxed but still similar pricing effects were observed. Saatcioglu and Starks (1998) examined the stock price–volume relation in a set of six Latin American markets. Using monthly index data, they documented a positive relation between the volume and the magnitude of price change.

The study by Trueman et al. (2003) examined the pricing of the Internet firms around their earnings announcements. The stock prices of the Internet firms increased during the 5 days prior to the earnings announcement and reduced during the 5 days following the announcement. On considering the several potential explanations for the observed price patterns, it was concluded that the price pressure (due to investor optimism and share demand) was the only parameter that received some support. Berger (2003) extended this study and focused on the major concerns raised by the price pressure explanation offered. Goyal and Welch (2003) observed that the primary source of poor predictive ability was parameter instability; for example, the dividend yield (as a parameter) failed to forecast the annual returns or the dividend growth rates.

Belter et al. (2005) presented a new dividend-adjusted blue-chip index for the Danish stock market covering the period 1985–2002. In contrast to other indices on the Danish stock market, the index was calculated on a daily basis. They used this index to analyse the time series properties of the daily, weekly and monthly returns, and the predictability of multiperiod returns.

Marisetty et al. (2008) investigated the securities price reaction to the announcements of rights issues by listed Indian firms during the period 1997–2005. They documented a positive but statistically insignificant price reaction to such announcements. Maniar et al. (2009) examined the effect of the expiration day of the index futures and options on the trading volume, variance and price of the underlying shares and observed that at the expiration hour, there was a significant increase in the volatility and insignificant pressure on the returns of the underlying securities.

Savor (2012) studied how the information presence affected the post-event performance of stocks experiencing large price changes, using regression analysis. The results implied that the investors under-reacted to news about the fundamentals and over-reacted to the other 'shocks' that moved the stock prices. Annaert et al. (2012) introduced a new monthly return series for the Belgian-owned equity, based on the Brussels stock market data for the period 1832–1914. Dividend income was considered to constitute the major part of total returns and the dividend distributions had a clear seasonal pattern.

Johnson and So (2012) examined the information content of the option and equity volumes when the agents were privately informed and the trade direction was unobserved. Golez (2012) showed that the S&P 500 futures were pulled towards the at-the-money strike price on the days when the serial options on the S&P 500 futures expired (pinning) and were pushed away from the cost-of-carry-adjusted at-the-money strike price, right before the expiration of options on the S&P 500 index (anti-cross-pinning).

Wahal and Yavuz (2013) analysed the role of style investing on asset-level return predictability. Style investing refers to an investment approach in which the rotation amongst different 'styles' is supposed to be important for successful investing, for example, placing money in the broad category of assets, such as 'growth' or 'emerging markets'. They based their analysis on the prediction provided by Barberis and Shleifer (2003) that under certain conditions, style investing could generate predictability in returns. They concluded that the investing behaviour in which investors chased style-returns amplified the waves in asset returns.

Section II: Scope, Data and Methodology

The research methodology adopted in the study to analyse equity returns in India has been delineated in this section.

Scope

The sample comprises the NSE 500 companies. The NSE 500 index of India comprises the top 500 companies listed on the NSE based on their market capitalization. The NSE 500 index represented 96.76 % of the free-float market capitalization and 97.01 % of the traded value of the stocks listed on the NSE as on 31 December 2013 (Source: National Stock Exchange (NSE) Website. http://www.nseindia.com/products/content/equities/indices/cnx_500.htm). Hence, virtually, the chosen sample presents a census on equity market returns in India.

The sample is representative in nature as the NSE 500 companies represent all industry groups. The date of sample selection was 11 March 2013. The period of the study is 1993–2014.

NSE 500 Index Background

The company Standard & Poor's (S&P) introduced its first stock-based index in 1923 in the USA. The index is float weighted now. That is, S&P calculates the market capitalization relevant to the index using only the number of shares

(called ‘float’) available for public trading (Source: Wikipedia website, http://en.wikipedia.org/wiki/S%26P_CNX_500).

The CNX 500 (hereby referred to as NSE 500) is India’s first broad-based benchmark of the Indian capital market. It is owned and managed by the Credit Rating Information Services of India Limited (CRISIL) and the NSE. Without the additional abbreviation to S&P CNX, the index name would be S&P CRISIL NSE index (Investopedia 2013).

The NSE 500 companies are disaggregated into 72 industry indices (as on the date of sample selection). Industry weightages in the index reflect the industry weightages in the market (Source: National Stock Exchange (NSE) website, http://www.nseindia.com/products/content/equities/indices/cnx_500.htm).

Secondary Data and Analysis

Focus on Long-Term Returns

Within the study period, distinct holding periods of various durations have been computed, as explained below. This has helped to bring out the effect of varying market conditions on the returns. The effect of the investment duration on returns is also brought out through the same. Since different investors have different time horizons for investments, the computation of returns according to the different investment durations serves a useful purpose.

The main focus is on the holding periods of medium and long durations, particularly five, ten and fifteen years. Computations for other durations have also been made, but in order to keep the presentation simple and not to allow the data to overwhelm the reader, the emphasis is on selected durations only. Further, we also considered it useful to compute returns for the one-year holding period.

Individual Companies and Portfolios

The basic computation of returns is for individual companies. The portfolio returns have been built up from individual company returns. This method requires more effort and time but has the advantage not only of ensuring greater accuracy but also of providing many more insights. However, the presentation emphasizes the entire portfolio’s returns. The rationale is that it provides a benchmark as well as credible statistics of equity returns. Such analysis is likely to be more useful as most of the professional equity investors, including individuals as well as institutions, have diversified portfolios.

Holding Periods

Within the study period, periods of varying plausible durations have been covered. For example, twenty-one 1-year periods (1993–1994, 1994–1995, 1995–1996, 1996–1997….2012–2013, 2013–2014), seventeen 5-year holding periods (i.e. 1993–1998, 1994–1999, 1995–2000, 1996–2001…2008–2013, 2009–2014), twelve 10-year periods (i.e. 1993–2003, 1994–2004, 1995–2005…2003–2013, 2004–2014) and seven 15-year periods (i.e. 1993–2008, 1994–2009, 1995–2010… 1998–2013, 1999–2014) have been covered. This was designed to bring out the effect of differing market conditions as well as the impact of differing durations of investment.

Share Prices

The share prices used in the computations are the average of the respective year's high and low prices. It is useful to mention here that the use of the year's 'average' price, however derived, had important advantages over the alternatives of using share prices at some fixed date, say, the year-end. As a large proportion of the listed shares in India are the shares of small- and medium-sized companies and are not traded daily, the use of the share prices on a fixed date would have resulted in the exclusion of such shares from the study. Also, the prices at any particular point of time are liable to be affected by chance factors. Tests conducted by Gupta (1981) have shown that the average of the high and low prices quite closely approximate the average based on more frequently collected price quotations, such as the daily, weekly or monthly prices.

Definition of Returns

The returns represent total returns, including both capital appreciation and dividends. They have been measured by deploying the method of (IRR).

The IRR is the discount rate 'r' in the following equation:

$$\text{Initial Purchase Price} = \left[D_1/(1+r)^1\right] + \left[D_2/(1+r)^2\right] + \ldots [D_\text{n} + S_n/(1+r)^n] \tag{4.1}$$

where

r	is the discount rate;
$D_{1,}\ D_2 \ldots D_\text{n}$	are the year-to-year cash dividends; and,
S_n	is the terminal price on the sale of investment at the end of n years

Bonus and Rights Issue Adjustments

Share prices and dividend data, used for computing the returns, have been adjusted for the bonus and rights issues made during the period of the study. For bonus issues, the adjustment is straight forward. For example, if a company issues 1:1 bonus, the prebonus price and dividend of one share should be compared with the sum of post-bonus price and dividend on two shares combined. Hence, the post-bonus share prices and dividend rate in all subsequent years are multiplied by a 'bonus adjustment factor' (which is derived as the ratio of the number of shares after the bonus issue to the number of shares before the bonus issue). The bonus adjustment factor will be 2/1 in the case of 1:1 bonus issue and 3/1 in the case of 2:1 bonus issue. The adjustment factor is recalculated after every bonus issue.

In the case of a rights issue, the adjustment is relatively more difficult. The adjustment method is designed to keep the shareholder's investment after the rights issue unchanged, i.e. exactly the same as before the rights issue. Most rights issues are often made significantly below the prevailing market price. Every shareholder has the option either to subscribe to the rights issue or to sell his/her right to someone else. The rights are traded in the market in the same way as shares. If the investor subscribes to the right, he/she will be making an additional investment which has been ruled out for the present purpose. If he/she sells his/her right, the price realized by him/her has the effect of reducing his/her investment, even though he/she continues to hold the same number of shares as before the rights issue. The reduction occurs because the ex-rights price is invariably lower than the cum-rights price. As mentioned earlier, it is assumed that the investor keeps his/her investment unchanged throughout the holding period. The 'rights adjustment factor' is intended to ensure this. It is derived by assuming that the shareholder first sells his 'right' and then immediately reinvests the sale proceeds by buying more shares of the company at the ex-right price. The assumption is that fractional shares can also be bought. The result of this is that the number of shares held by him/her will increase such that the value of his/her holding at the ex-right price will be the same as the value of his/her earlier holding at the cum-right price. For the detailed formulae and illustrative examples on bonus and rights issue adjustments, please refer to Annexure 4.1.

Weights for Computing Portfolio Returns

The returns over a holding period were first computed for each individual company and then weights were attached to each, based on the market capitalization of each company at the beginning of each holding period. Hence, the relative weights of the individual companies in the portfolio would vary from period to period. Even if the companies remain the same, the relative prices of their shares and, therefore, the relative weights could change from one period to another. The shares included in the portfolio are assumed to be purchased in the initial year of each holding period at that year's average price (average of high and low) and disposed of in the terminal year of the particular holding period at that year's average price.

It is important to mention here that when the market capitalization at the beginning of each holding period is used as the relative weight, there is no auto-correlation between returns and market capitalization. The portfolio for each holding period is new even if the companies remain the same because a portfolio is defined by two characteristics, viz., (1) the total acquisition cost and (2) the relative weights of the component companies. These two characteristics, which can make all the difference to the rates of return (RoR), go on changing from one holding period to another.

Dividends

Cash dividends are taken into account in the respective years and are not assumed to be reinvested.

Transaction Costs and Taxes

Brokerage, other transaction costs and personal income taxes have not been factored in the computation of returns. Whilst the reason for excluding brokerage and other transaction costs is logistic convenience, the reasons for income tax are two: first is that the personal income tax rates vary from investor to investor and second is that dividends were free of tax during part of the study period of 21 years.

Data Sources and Analysis

The relevant data (secondary) were collected from the Bloomberg® database, for twenty-one years (1994–2014). Descriptive statistical values/positional values, i.e. mean, standard deviation, variance, coefficient of variation, minimum, maximum, skewness, kurtosis and quartile values, have been computed for each holding period. The entire set of data has been analysed using Microsoft Excel® spreadsheets and the statistics software SPSS®, namely Statistical Package for Social Sciences.

Section III: Portfolio Returns for Varied Holding Periods

The objective of this section is to enumerate RoR earned on the NSE portfolio for varied holding periods ranging from 1 year to 15 years. The relevant data (along with their mean, standard deviation, variance, coefficient of variation, minimum, maximum, skewness, kurtosis and quartile values) are presented in Tables 4.1, 4.2, 4.3 and 4.4. These tables represent RoR for holding periods of 15, 10, 5 and 1 year,

Table 4.1 Rates of return for the fifteen-year holding period (when equities were purchased at the year's average price and then sold 15 years later, at the terminal year's average price)

Holding period	Rates of return (per cent per annum) on the NSE 500 portfolio	Holding period	Rates of return (per cent per annum) on the NSE 500 portfolio
1993–08	16.24	1997–12	19.81
1994–09	12.77	1998–13	20.07
1995–10	19.37	1999–14	20.72
1996–11	19.89		
Statistic		*Value*	
Mean returns		18.41 %	
Standard deviation		2.88 %	
Variance		8.28 %	
Coefficient of variation		15.64 %	
Minimum returns		12.77 %	
Maximum returns		20.72 %	
Skewness		−1.62	
Kurtosis		1.95	
Lower quartile		16.24 %	
Upper quartile		20.07 %	

Table 4.2 Rates of return for the ten-year holding period (when equities were purchased at the year's average price and then sold 10 years later, at the terminal year's average price)

Holding period	Rates of return (per cent per annum) on the NSE 500 portfolio	Holding period	Rates of return (per cent per annum) on the NSE 500 portfolio
1993–03	4.37	1999–09	18.50
1994–04	11.87	2000–10	14.90
1995–05	16.61	2001–11	25.79
1996–06	21.78	2002–12	23.58
1997–07	24.07	2003–13	25.38
1998–08	26.02	2004–14	22.58
Statistic		*Value*	
Mean returns		19.62 %	
Standard deviation		6.65 %	
Variance		44.21 %	
Coefficient of variation		33.89 %	
Minimum returns		4.37 %	
Maximum returns		26.02 %	
Skewness		−1.21	
Kurtosis		1.07	
Lower quartile		15.33 %	
Upper quartile		25.05 %	

Table 4.3 Rates of return for the five-year holding period (when equities were purchased at the year's average price and then sold 5 years later, at the terminal year's average price)

Holding period	Rates of return (per cent per annum) on the NSE 500 portfolio	Holding period	Rates of return (per cent per annum) on the NSE 500 portfolio
1993–1998	−1.09	2002–2007	36.19
1994–1999	2.14	2003–2008	36.70
1995–2000	28.83	2004–2009	44.18
1996–2001	8.90	2005–2010	14.60
1997–2002	8.90	2006–2011	25.08
1998–2003	12.60	2007–2012	16.18
1999–2004	10.13	2008–2013	11.71
2000–2005	22.53	2009–2014	11.47
2001–2006	5.55		
Statistic		*Value*	
Mean returns		17.33 %	
Standard deviation		12.92 %	
Variance		166.94 %	
Coefficient of variation		74.56 %	
Minimum returns		−1.09 %	
Maximum returns		44.18 %	
Skewness		0.72	
Kurtosis		−0.35	
Lower quartile		8.90 %	
Upper quartile		26.96 %	

respectively. The RoR have been depicted in Figs. 4.1, 4.2, 4.3 and 4.4, respectively.

Even though the average annual returns of the fifteen-year holding period [18.41 % (Table 4.1)] are comparable with the ten-year holding period average annual returns (19.62 %), the coefficient of variation for the fifteen-year holding period (15.64 %) is less than half of its counterpart in the ten-year holding period [44.21 % (Table 4.2)]. This is an indication of the market providing substantial and safe returns with longer holding periods. Low negative skewness and the kurtosis figures are an indication of nearly similar return values when compared to the average returns which is evident from the values in these tables.

Table 4.4 Rates of return for the one-year holding period

Holding Period	Rates of Return (per cent per annum) on the NSE 500 Portfolio	Holding period	Rates of return (per cent per annum) on the NSE 500 Portfolio
1993	0.13	2004	25.49
1994	−17.11	2005	65.81
1995	7.39	2006	17.26
1996	−2.60	2007	27.45
1997	9.04	2008	−36.45
1998	17.59	2009	94.42
1999	164.60	2010	14.62
2000	−53.65	2011	−3.60
2001	15.09	2012	12.77
2002	−2.41	2013	10.96
2003	100.47	2014	22.60
Phase 1 (1993–2002)		13.81	
Phase 2 (2003–2008)		33.34	
Phase 3 (2009–2014)		25.30	
Statistic		*Value*	
Mean returns		22.27 %	
Standard deviation		47.53 %	
Variance		2258.72 %	
Coefficient of variation		213.43 %	
Minimum returns		−53.65	
Maximum returns		164.60 %	
Skewness		1.49	
Kurtosis		3.08	
Lower quartile		−2.46 %	
Upper quartile		25.98 %	

It is to be borne in mind that the returns in the holding period, 1993–2003, are low due to the following reasons: (i) only few of the sample companies were present for trading in the specified period, (ii) NSE started trading only in 1994 and hence the volume and price levels were not encouraging initially. Further, the decline in return in the 1999–2009 and 2000–2010 holding periods may be attributed to the US financial crisis that originated in 2008 and had substantial repercussions in stock markets worldwide.

The average returns for the ten-year holding period are close to 20 % (Table 4.2) with a coefficient of variation of 33.89 % which indicates relatively stable returns for this holding period vis-à-vis the five-year holding period. It is eloquently borne out by the fact that the coefficient of variation for 5-year holding period is more than twice (at 74.56 %) vis-à-vis 10-year holding period (having coefficient of variation

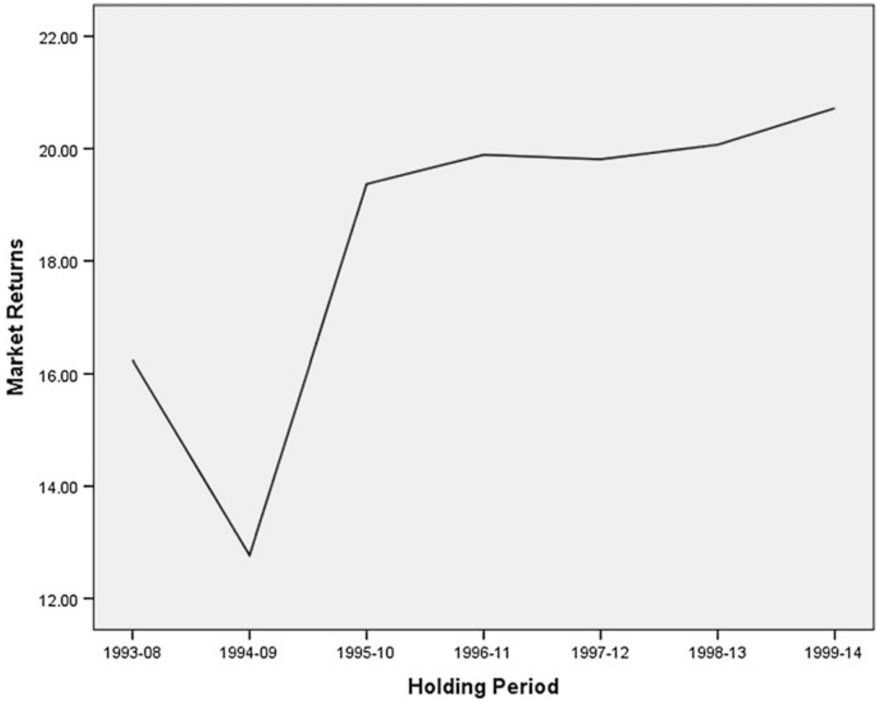


Fig. 4.1 Rates of return for the fifteen-year holding period

of nearly 34 %). Thus, the 10-year holding period appears to be an attractive investment option for the long-term investor.

From Table 4.3, it is evident that the average returns are 17.33 % for the period. There appears, however, a significant variance in the returns. This should be seen in the light of the fact that the returns for the first two periods (1993–1998 and 1994–1999) could be abnormally low due to the reasons mentioned earlier. Hence, the variance computed could be on the higher side. The same is also indicated by the low skewness and negative kurtosis figures, both indicating lower volatility in the distribution.

Table 4.4 presents the computed returns for the twenty-one 1-year holding periods to give an indication of short-run returns. The striking feature of these returns is perhaps the substantial volatility evident in the returns. The returns vary from a minimum of −53.65 % to a maximum of 164.60 % over the past two decades. The same is evident from the high skewness and kurtosis values, both indicating higher values dominating the distribution and peaks in the data (indicating volatility), respectively. Even though the focus of this study is on medium- and long-term returns, it is useful to understand the behaviour of short-term returns (based on 1-year holding period), as well, in order to arrive at a more comprehensive perspective.



Fig. 4.2 Rates of return for the ten-year holding period

Section IV: Overall Characteristics of Returns

The Indian equity market, represented by the NSE 500 companies (constituting 96.27 % of the market capitalization), appears to be an attractive investment destination for long-term investors as well as short-term investors. Mean annual returns are over 20 % (22.27 %) for 1-year holding period (Table 4.4), 17.33 % for the 5-year holding period (Table 4.3), 19.62 % for the 10-year holding period (Table 4.2) and 18.41 % for the 15-year holding period (Table 4.1). Although, there does not exist substantial difference in RoR for holding periods of 5, 10 and 15 years, yet the markets appear to favour the long-term investor as the volatility, measured through the coefficient of variation, falls substantially as the investment horizon (holding period) increases.

Equity returns have been extremely volatile in the short run with a coefficient of variation of 213.43 % for the 1-year holding period which decreased significantly to 15.64 % for the 15-year holding period.

In sum, it is reasonable and safe to contend that Indian equity markets provide robust and stable returns over the long-term investment horizon, say 5-, 10- or 15-year holding periods. In the short run too (one year), the average returns of 22.27 % (in absolute terms) are attractive. However, the speculative market lends

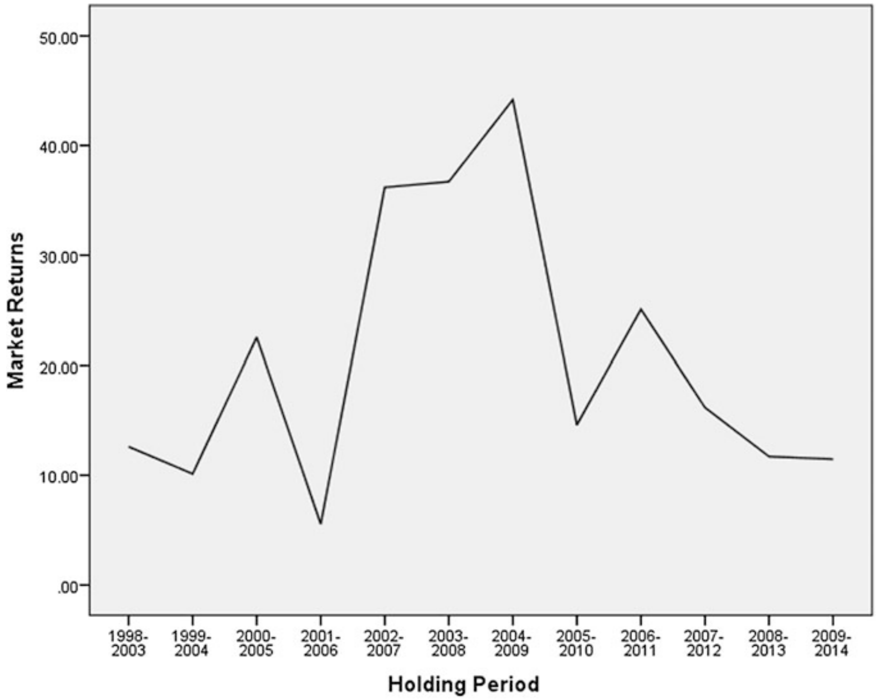


Fig. 4.3 Rates of return for the five-year holding period

volatility to the returns making it a less safe option vis-à-vis the long-term counterpart. The same is also corroborated by the minimum and maximum value of returns over different time horizons. From the foregoing, it appears advisable to adopt a long-term investment horizon whilst investing in the Indian equity market to earn better/higher/safer returns.

Moreover, it is rather encouraging to note that the returns of the sample companies appear robust compared to the findings of Gupta and Choudhary (2000) as their sample comprised of the Sensex portfolio (an index of the top 30 companies based on market capitalization) and such returns would have been high as the constituent companies are amongst the best performers; whereas the sample of NSE 500 companies is a much larger and broad-based sample and hence the returns reported are indicative of the near complete market returns. Hence, it appears safe to assume that the success story of the Indian equity market continues, both in terms of the returns and in their increasing market breadth and coverage.

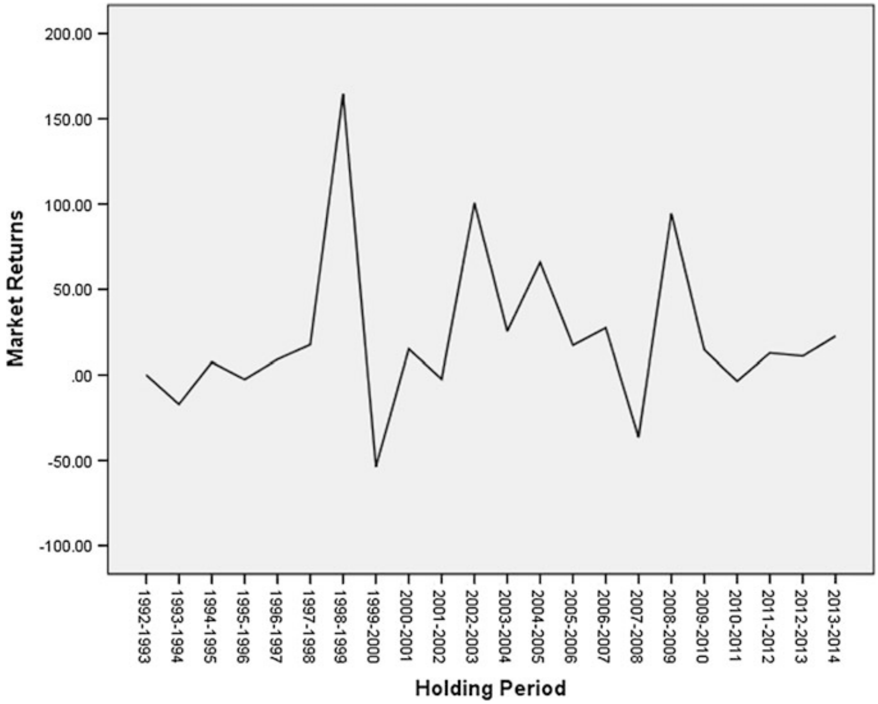


Fig. 4.4 Rates of return for the one-year holding period

Periods of High Returns

From the beginning of the National Stock Exchange and the study period (1993–2014), the returns were generally high, often well over 20 % per annum, for the sample companies. Substantially, high returns of 25–30 % for several five-, ten- and fifteen-year periods were earned on the portfolio comprising the NSE 500 companies. In terms of annual returns, the years 1999, 2003 and 2009 recorded abnormally high returns.

Periods of Low Returns and Losses

On the other hand, even negative returns (losses) were noted during the study period; such negative returns have been observed primarily in the one-year time period, for example, in the years 1994, 1996, 2000, 2002, 2008 and 2011. This could, in part, be attributed to the substantial foreign institutional investment outflows from the capital markets in these years (Shrivastav 2013), the Satyam scam of 2008 and also due to the speculative pressures on return volatility in the short run.

However, over longer investment horizons, even though the returns were low, they were never negative, except for the 1993–1998 periods.

Magnitude of Variations

The variations in returns have been large, particularly in the short run (one-year holding period). For instance, returns increased from a negative 2.41 % in 2002 to 100.47 % in 2003 and from −36.45 % in 2008 to 94.42 % in 2009 (Table 4.4). In marked contrast, returns dropped drastically from a high of 164.60 % in 1999 to the loss of −53.65 % in 2000. The volatility thus exhibited in the short run would certainly not lead to a comfortable experience for the risk-averse investor.

Three Phases

For a clearer understanding of the short-run returns, the twenty-one-year study period was divided into three phases. This exercise was carried out simply to understand the overall trend of returns over the period of the study. Phase 1 covered the first half of the study period (1993–2002). The second, more recent half of the study period comprised of the remaining years from 2003-2014. This period was subdivided into two 6-year periods, viz., phase 2 (2003–2008) and phase 3 (2009–2014). From the average returns recorded for phase 2 (33.34 %) vis-à-vis the average returns recorded for phase 1 (13.81 %) and phase 3 (25.30 %), it is evident that phase 2 witnessed a period of high returns, indicative of a bullish market phase during the study period.

Two Components of Total Return

The total return has two components, viz., capital appreciation and dividends. During the calculations, it was observed that the total return was dominated by the capital appreciation component (as expected) and such dominance has increased over time. The same was reported by Gupta and Choudhary (2000) in their study.

Declining Importance of Dividend

A decline in the contribution of dividends to the total returns on equities is confirmed by declining dividend yields (i.e. dividend per share as per cent of the market price). This should not be taken to mean that dividend per share has

declined. In fact, the dividend has been increasing as the earning-per-share (EPS) has been going up. The falling dividend yield is due to the share prices rising faster than the dividend growth.

Further, the Indian companies have been recording a declining dividend payout (D/P) ratio over the past two decades, an indication of higher retentions due to the sound investment/growth opportunities available with them. This is resulting in higher capital appreciation in terms of the rising share prices for investors (Jain et al. 2013).

Comparison with Debt Instruments

Any analysis of equity returns would be incomplete without a comparison of such returns with the returns offered by investment avenues/alternatives available with investors, say, primarily corporate debt instruments and banks' fixed deposits. Apart from returns, it is useful to state here that equity investment gives the investor ownership rights in the working of a business enterprise, an aspect not available in debt investment. The comparisons of both long-term returns and short-term returns are necessary to provide a complete perspective. In strict sense, equity returns are not comparable with the stated competing investment outlets (given the more risky nature of equity returns); the comparison is likely to be useful as these sources (in practice) are competitive in nature. As per finance theory, returns on equity should be higher vis-a-vis debt instruments and fixed deposits to compensate the investor (s) for assuming extra risk. Viewed in this context, the discussion would provide the extent of risk premium (if any) available to equity investors in India.

a. Long-Term Returns' Comparisons

The best annual interest rates available on 15-years, 10-years and 5-years fixed deposits (to compare with the 15-years, 10-years and 5-years equity holding periods) have been 10 % on an average over the study period (Source: Moneycontrol website 2014). The average returns for the equity portfolios of these durations were 18.41, 19.62 and 17.33 % for 15-, 10- and 5-year holding periods, respectively.

It is to be noted that interest earned on deposits is taxed in the hands of the investor in India, as are capital gains. At the time of writing this chapter, the interest income (taxed at the personal income tax slab of the individual) could attract a maximum tax rate of 30 %, whereas the long-term capital gains tax is 20 %. It is evident from the tax rates that the after-tax computation of equity returns would be greater than the after-tax computation of interest income (assuming the highest tax slab rate of 30 %). The other advantage that accrues to equity investment is the liquidity (in terms of transaction and the entry/exit into/from the market). On both the counts of taxes and liquidity, equity investment appears a better alternative than debt. However, it is important to consider the volatility present in equity

investment. For the risk-averse investor, debt instruments provide attractive return with low risk. Assuming debt instruments to be nearly risk-free, the 'risk premium' on equity, prima-facie, appears to be approximately 8 % in India (from the statistics computed). This finds support in the figures mentioned in the surveys conducted by Pricewaterhouse Coopers and Ernst and Young to determine the equity risk premium in India [Pricewaterhouse Coopers website (2015) and Ernst and Young website (2015)].

Overall, it appears that India continues to be an attractive investment destination for both equity and debt instruments as it caters to the requirements of both the risk-taking and risk-averse investor.

b. Short-Term Returns' Comparison

Figure 4.5 presents the average call money interest rates and 1-year bank interest rates for a period of 25 years (1976–2011). The 1-year bank interest rates have been relatively stable (fluctuations ranging from 8 to 12 % over 25 years). The call money market rates, comparatively, have shown wider fluctuations with rates rising to nearly 20 %, manifesting the vast volatility in short-term equity returns. However, debt instrument returns (interest rates) provide safer (as is expected) returns when compared to 1-year equity returns. For example, when equity returns

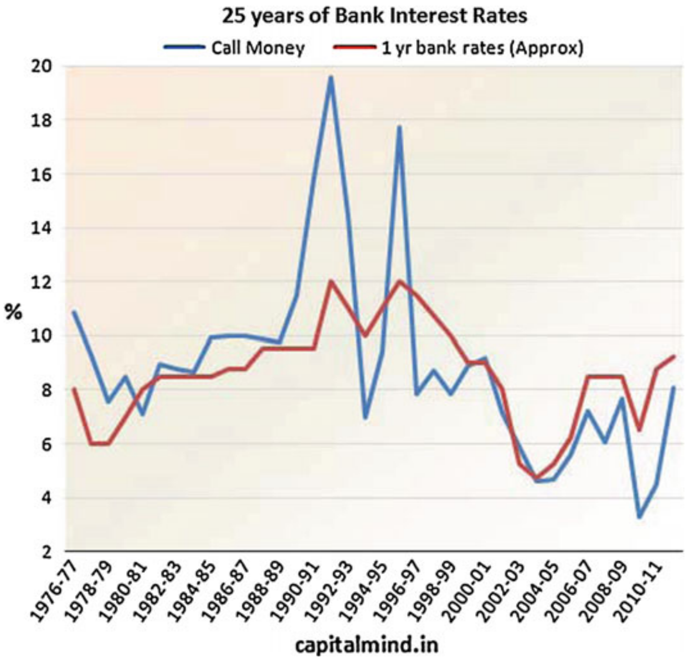


Fig. 4.5 Twenty-five years of bank interest rates in India (*source* Capitalmind website 2014)

Table 4.5 Comparison of different investment avenues—2015

Investment option	Risks/liquidity	Returns	Taxation	Suitability
Equity	High risk and high liquidity. No limit on amount invested	Market linked returns. Good potential	Long-term capital gain taxed at the rate of 20 % and short-term capital gain taxed at slab rates	Needs high-risk appetite
Bank fixed deposits (FDs)	Very low risk and low liquidity. No limit on amount invested	Low returns of maximum of 9.15 %, but assured	Returns are fully taxable	Good for very low-risk investors and those in the nil or low-tax brackets
Post office schemes	Low risk and low liquidity. Limit on amount to be invested	Monthly income saving (MIS) scheme provide 8 % interest. Time deposit 6.25–7.5 %	Since returns are taxable, the post-tax returns will be still lower	Good for very low-risk investors and those in the nil or low-tax brackets. However, high inflation may eat into the returns
Public provident fund (PPF)	Low risk with very low liquidity (15-year lock-in period. Partial withdrawal allowed after 6 years). Limit on amount to be invested	Assured returns of 8.70 % per annum	Interest is tax-free	Good tax saving investment option. Suitable for investors in high-tax bracket
Kisan vikas patra (KVP)	Low risk with low liquidity (2 years and 6 months lock-in). No limit on amount to be invested	Amount doubles in 100 months	Interest fully taxable	Not very attractive vis-à-vis other options like 5-year Bank FDs
National savings certificate (NSC)	Low risk with low liquidity (5 years lock-in). No limit on amount to be invested	Assured returns of 8.50 % per annum	Interest fully taxable	Not very attractive vis-à-vis other options like 5-year Bank FDs

(continued)

Table 4.5 (continued)

Investment option	Risks/liquidity	Returns	Taxation	Suitability
Unit linked insurance plans (ULIPs)	Low to high risk depending on the investment option, i.e. pure debt or mixed or pure equity. Low liquidity (3–5 years lock-in period)	Low to high depending on the investment option	Depend on investment option	Not an attractive option due to high charges, low flexibility and low diversification

were −3.60 % in 2011 and −53.65 % in 2000, the bank interest rates were nearly 9 %. Hence, it appears that India provides debt markets as a safer option in times of volatility in equity returns providing the investors with the much required choice to counter such volatility, which is present in one market. However, in 2008, both equity returns and interest rates fell due to the financial crisis, which is perhaps to be expected, indicating that certain fundamental and systematic factors may affect both markets adversely, leaving the investor with no choice but to diversify into international financial markets.

Further, in an attempt to aid investors, Table 4.5 has been prepared to provide a comparative analysis of equity and various debt instruments investment avenues available in India, based on aspects such as risk/liquidity, returns, taxation and suitability with respect to 2015. However, it would be unfair to compare these avenues directly as each of them represents an individual investor's unique risk–return profile and preference.

Section V: Concluding Observations

This chapter presents the equity returns for the Indian stock market, represented by the NSE 500 companies for the past two decades (1993–2014).

The returns have been computed for varying holding periods, viz., fifteen-, ten-, five- and one-year periods. Along with returns, other statistics, used to measure risk or volatility, have also been computed to present the overall picture of risk and return emanating from the Indian equities. The returns for all periods average around 20 % which is encouraging. However, the volatility present in the short term (one-year holding period) is substantially high (with a coefficient of variation of 213.43) indicating speculative forces at play. It is gratifying to note that such volatility decreases significantly as the holding period increases; the coefficient of variation decreases substantially to 15.64 % for the fifteen-year holding period, indicating that the market favours long-term investors.

The findings are in contrast to Gupta and Choudhary (2000) with respect to the volatility exhibited in returns for the period. Gupta and Choudhary (2000) reported high returns but with high volatility for almost all holding periods, whereas in this case, the volatility is substantial for the one-year holding period but reduces, to a marked extent, over longer holding periods of five, ten and fifteen years. Further, recent returns over the past decade (phases 2 and 3) have been substantially higher than the previous one (phase 1). This, perhaps, is a growing indication of the inherent fundamental strength of the Indian companies and also of the growing sophistication in the capital market trading/dealings.

It appears safe to assume that the Indian stock markets offer attractive returns in the short run as well as the long run. But, it would be prudent to stay invested for a longer period if the investor is risk-averse, as the volatility present in the short run may eat away into short-run returns.

Further, to get a complete perspective, equity returns were compared with long-term and short-term debt returns (interest rates). In terms of after-tax returns and liquidity, equity returns in India fare better than debt returns. However, in terms of risk (volatility), debt returns provide a safer option. Further, the debt markets provide recourse to the investor in terms of diversification when equity markets are volatile, due to their continued stability.

In sum, India appears to be an attractive investment destination for both the risk-taking and the risk-averse investors. Indian companies are recording robust growth in their profitability (Jain et al. 2013) and are going to be strong contributors to the overall economic growth and development of the country.

Annexure 4.1

Disclaimer: These examples have been adapted from the Website 'Accounting Simplified.com' for illustrative purposes to enhance the understanding of the readers.

Example of Bonus Share Adjustment

ABC Ltd., which has a year-end of 31 December 2012, issued 1 for 4 bonus shares on 30 June 2012.

Following information relates to ABC Ltd.:
Ordinary Shares as on 1 January 2011= 40,00,000 (40 lakhs)
Earnings attributable to ordinary shareholders:
INR 50,00,000 2011
INR 50,00,000 2012

Calculation of Earnings Per Share for 2011 and 2012 for presentation in financial statements for the year ended 31 December 2012 would be as follows:

Step 1:	**Calculate the number of bonus shares**	
	Number of shares eligible for bonus shares	40,00,000
	Number of bonus shares (40,00,000 × 1/4)	**10,00,000**
Step 2:	**Calculate weighted average Shares**	
	2011 Shares at the start of the year	40,00,000
	Add: Bonus shares *(Step 1)*	10,00,000
	Weighted average shares	**50,00,000**
	2012 Shares at the start of the year	40,00,000
	Add: Bonus shares *(Step 1)*	10,00,000
	Weighted average shares	**50,00,000**

Note that even though bonus shares were issued half way through 2012, they are included in the calculation of weighted average shares without time apportionment for both 2012 and 2011 (i.e. as if the bonus shares had been issued before the year 2011).

Step 3:	**Calculate earnings per share**	
	2011 Earnings attributable to ordinary share holders	INR 50,00,000
	Weighted Average Shares *(Step 2)*	50,00,000
	Earnings per share (INR 50,00,000/50,00,000)	**INR 1**
	2012 Earnings attributable to ordinary share holders	INR 50,00,000
	Weighted Average Shares *(Step 2)*	50,00,000
	Earnings per share (INR 50,00,000/50,00,000)	**INR 1**

Note that despite the bonus issue, there is no change in the earnings per share for the two years as there is no change in earnings. The effect of bonus issue is eliminated by incorporating the bonus shares adjustment in the calculation of weighted average shares for both years.

The EPS calculated as above illustrates the fact that the performance of ABC Ltd. has remained stable over the past two years. If no adjustment for bonus shares had been made, EPS for 2012 would be lower than 2011 despite the fact that there is neither a change in the earnings nor in the resources to earn a return to shareholders. This would have presented an unfair comparison of the performance of ABC Ltd.

Calculation of weighted average shares for subsequent periods will also incorporate bonus shares in similar manner (i.e. added in full without time apportionment).

Example for Rights Issue Adjustment

ABC Ltd. issued 1 for 4 rights shares on 31 March 2013 at an exercise price of INR 1. Market value of its shares immediately prior to the rights issue was INR 1.5 per share. ABC Ltd. had 10 lakh shares before the issuance of rights shares. All rights were exercised by shareholders on 31 March 2012.

Formula

$$\text{Theoretical Ex} - \text{Rights Price} = \frac{\text{Market Value of shares prior to rights issue} + \text{Cash raised from rights issue}}{\text{Number of shares after rights issue}}$$

Theoretical Ex-Rights Price may be calculated as follows:

Step 1: Calculate market value of ABC Ltd. prior to the rights issue		
Market Value before rights issue	(INR 1.5 × 10 lakh shares)	INR 15,00,000
Step 2: Calculate cash proceeds raised from the rights issue		
Cash raised from rights issue	(INR 1 × 2,50,000*)	INR 2,50,000
**(10 lakh/4 = 2,50,000 rights shares)*		
Step 3: Calculate number of shares after the rights issue		
Number of Shares	(10,00,000 + 2,50,000 *[step 2]*)	12,50,000
Step 4: Calculate Theoretical Ex-Rights Price		
$\text{Theoretical Ex} - \text{Rights Price} = \frac{\text{INR } 15{,}00{,}000\,(\textit{Step } 1) + \text{INR } 250{,}000(\textit{Step } 2)}{12{,}50{,}000(\textit{Step } 3)} = \text{INR } 1.4 \text{ per share}$		

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Chapter 5
Rates of Return—Disaggregative Analysis

After assessing the different aspects of returns at an aggregate level for the sample firms, it would be equally useful to analyse the returns on a disaggregative basis. The sample under study is a large one with 500 companies and almost 97 % of the market capitalization. Hence, there could be aspects within the sample companies, viz. the age of the company, the size of the company, the ownership structure and the underlying sector/industry affiliation to which the company belongs, that could impact its returns.

In line with the above considerations, this chapter presents a disaggregative analysis of the returns earned by the companies based on their age, size, ownership structure and the underlying sector/industry affiliation. For better exposition, this chapter has been organized into five sections. Section I contains the introduction, highlighting the parameters being considered; Section II enumerates briefly the literature review focusing on disaggregative analysis. Section III contains the methodology used in the analysis. The presentation of returns based on the age, size, ownership structure and underlying sector/industry affiliation of the sample companies and their interpretations form the subject matter of Section IV. The summary is presented in Section V.

Section I: Introduction

The sample comprising of the NSE 500 companies is segregated on the basis of age, size, ownership structure and the underlying sector/industry affiliation. This section provides a brief overview of the modus operandi in which each aspect has been considered.

S. Singh et al., *Equity Markets in India*, India Studies in Business and Economics, DOI 10.1007/978-981-10-0868-9_5

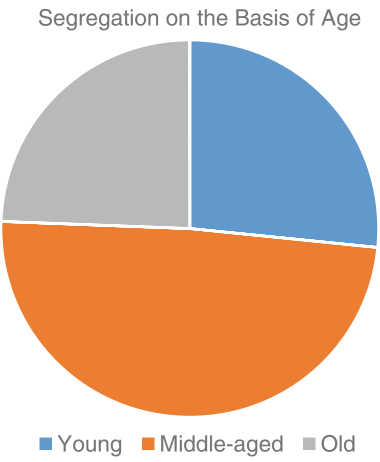


Fig. 5.1 Segregation of the sample companies on the basis of age

Age

The constituent companies are divided into 3 categories based on their age, namely 'young', 'middle-aged' and 'old'. The quartile values of age form the basis for the segregation. All companies that fall within the first quartile are classified as 'young', the companies that fall between the first and third quartiles are classified as 'middle-aged' and those lying above the quartile 3 are referred to as 'old'. As a result of this classification, 133 companies fall in the 'young' category, 245 companies in the 'middle-aged' category and 122 companies in the 'old' category (Fig. 5.1).

Size

For the purpose of analysis, the constituent companies have been divided into 3 categories based on their size, namely 'small', 'medium' and 'large'. The quartile values of the company's market capitalization, for each year, form the basis for the segregation. All companies within the first quartile have been classified as 'small', companies between the first and third quartiles designated as 'medium' and those lying above the quartile 3 as 'large'.

Ownership Structure

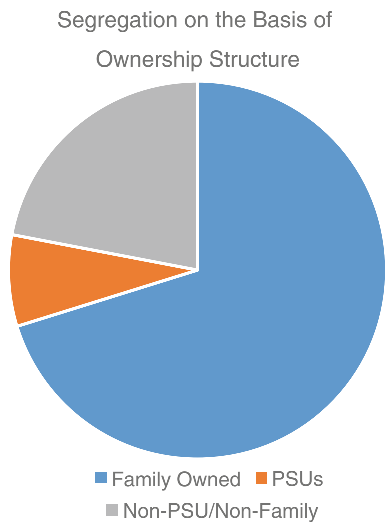
The ownership structure of the sample companies is primarily based on whether these companies are family-owned companies or non-family-owned companies.

A family-owned company is one in which the decision-making is influenced by more than one member of the same family who have a close association with the company, through leadership and/or ownership (Entrepreneur website 2015). The family owns a significant portion of the stock, though not necessarily a majority (Harvard Business Review 2012). From the non-family-owned companies, a further segregation on the basis of whether these companies are public sector undertakings (PSUs) or not has been made. Thus, the segregation of the sample companies on the basis of ownership structure is ‘family-owned’, ‘PSUs’ and ‘non-PSU/non-family’.

On analysis of the ownership structure, it has been observed that more than two-third (70.20 %) of the NSE 500 companies are family-owned businesses. The remaining less than one-third (29.80 %) of the non-family-owned businesses have more than one-fourth (26.17 %) of the constituent companies being central/state government-owned PSUs. In terms of numbers, there are 351 (70.20 %) family-owned businesses, 39 (7.80 %) PSUs and 110 (22 %) non-family/non-PSU companies in the sample. As a result, more than three-fourth (78 %) of the NSE 500 companies are either family-owned or government-owned businesses and less than one-fourth are non-family corporates (Fig. 5.2). From these statistics, it is apparent that the family-owned business enterprises constitute the major segment of the Indian corporate sector, warranting effective corporate governance. The following is witnessed in this context: the Indian economy is dominated by large entities with majority shareholding in the hands of a few.

Economically, this may not be a desirable situation for any country, more so for a socialist economy, like India. The objective of a socialist economy is to ensure that the wealth created in the economy does not lie under the control of a few families or organizations, but is rather equitably distributed amongst the population. It is imperative that the Indian government put in systems to encourage entrepreneurial

Fig. 5.2 Segregation on the basis of ownership structure of sample companies



development in the country so that more and more non-family/government-owned businesses may contribute towards wealth creation and distribution.

Underlying Sector/Industry Affiliation

For the purpose of the disaggregative analysis, the 500 companies were regrouped into constituent sectors to reduce the number of sectors to 10 from 73, primarily with intent to have an adequate/good number of companies in each sector for better statistical analysis.

Section II: Literature Review

Few studies have been conducted to analyse the characteristics of companies and their impact (if any) on their risk and/or returns.

Fisher (1959) demonstrated that firm's size and financial leverage were important determinants of equity risk. However, the study of individual firms' risk as related to their underlying characteristics began with the seminal work of Beaver et al. (1970); their study examined the relationship of certain accounting ratios (payout, liquidity, earning variability, etc.) to the firm's systematic risk (beta) and reported a strong and significant association between them. Ben-Zion and Shalit (1975) investigated the major determinants of equity risk through the analysis of the firm's underlying characteristics, specifically the firm's size, its financial leverage and its dividend record.

Logue and Merville (1972) employed a multiple regression technique to relate financial variables and estimated beta. Assets size, return on assets and financial leverage were reported to be significant. Hamada (1972) and Galai and Masulis (1976) linked the firm's equity beta with factors such as level of financial leverage, debt maturity, variation in income, cyclicality, operating leverage, dividends and growth. Banz (1981) examined the empirical relationship between the returns and the total market value of New York Stock Exchange (NYSE) common stocks. It was observed that smaller firms (by and large) had higher risk-adjusted returns than larger firms. Wong and Lye (1990) provided evidence on the relationship between stock returns and the effects of firm size and earnings-to-price ratio (E/P). It was concluded that stock returns were significantly related to both size and E/P.

Fletcher (1997) examined the conditional relationship between beta and returns in the UK for a time span of 20 years, 1975–1994. His result supported the findings of Fama and French (1992) as well as of Strong and Xu (1997) as there was no evidence of a significant risk premium on beta when the unconditional relationship between beta and return was examined. He also did not observe any significant relationship between size and returns. Lau et al. (2002) assessed the relationship

between stock returns and beta, size, the earnings-to-price (E/P) ratio, the cash flow-to-price ratio, the book-to-market equity ratio and sales growth (SG) by analysing the data of the Singapore and Malaysian stock markets for the period 1988–1996. The analysis revealed a negative relationship between size and stock returns as well as between weighted average annual sales growth and stock returns for the Singapore stock market. For the Malaysian stock market, they noted a negative size effect and a positive *E*/*P* effect on stock returns.

Ho et al. (2006) examined the pricing effects of beta, firm size and book-to-market value (BV/MV), but conditional on market situations, i.e. whether the market was bullish or bearish, using Hong Kong equity stock data. Manjunatha and Mallikarjunappa (2012) examined the validity of the five parameter model (the combination of five variables, viz. beta (β), size, *E*/*P*, BV/MV and market risk premium (R_m-R_f)) on the Indian stock returns using cross-sectional regression. The results indicated that the combination of β, size, E/P, BV/MV and (R_m-R_f) variables explained the variation in security returns.

The study undertaken in this chapter is a modest attempt to present a disaggregative analysis focusing on the parameters of age, size, ownership structure and underlying sector/industry affiliation, with respect to returns, of the sample companies from the Indian stock market.

Section III: Methodology

The research methodology adopted in this chapter to conduct the disaggregative analysis by dividing the sample companies on the basis of age, size, ownership structure and underlying sector/industry affiliation has been delineated in this section.

Scope

The sample comprises of the top 500 companies listed on the NSE based on their market capitalization and is a part of the NSE 500 index. The NSE 500 index represented about 96.76 % of the free-float market capitalization and 97.01 % of the total traded value at NSE (source: National Stock Exchange (NSE) Website. http://www.nseindia.com/products/content/equities/indices/cnx_500.htm). Hence, virtually, the chosen sample presents a census on equity market returns in India.

The date of sample selection was 11 March 2013 studied over the period of 2001–2014. This universe has been chosen as it is most likely to be an accurate representation of the Indian stock market (given the above facts).

NSE 500 Index Background

Introduced by the company Standard & Poor's (S&P), the index has traditionally been market value-weighted; that is, movements in the prices of stocks with higher market capitalizations (the share price times the number of shares outstanding) have a greater effect on the index than companies with smaller market capitalizations. However, the index is now float-weighted (source: Wikipedia Website. http://en.wikipedia.org/wiki/S%26P_CNX_500).

Its Indian counterpart, the CNX 500 (hereby referred to as NSE 500) is India's first broad-based benchmark of the Indian capital market. The NSE 500 companies were disaggregated into 72 industry indices (as on the date of sample selection). Industry weightages in the index reflect the industry weightages in the market. For example, if the housing sector has a 5 % weightage in the universe of stocks traded on NSE, housing stocks in the index would also have a representation of 5 % in the index (source: National Stock Exchange (NSE) Website. http://www.nseindia.com/products/content/equities/indices/cnx_500.htm).

Secondary Data and Analysis

Individual Companies and Disaggregated Portfolios

The basic computation of returns is for individual companies. The disaggregated portfolio returns have been built up from individual company returns. This method requires more effort and time but has the advantage of not only ensuring greater accuracy but also providing better insights. However, the presentation emphasizes the entire disaggregated portfolio's returns. The rationale is that it provides a benchmark as well as credible statistics of equity returns. Such analysis is likely to be more useful as most of the professional equity investors, including individuals and institutions, have diversified portfolios based on varying parameters.

Share Prices

The share prices used in the computations are the average of the respective year's high and low prices. It is useful to mention here that the use of the year's 'average' price, however derived, had important advantages over the alternatives of using share prices at some fixed date, say, the year-end. As a large proportion of the listed shares in India are the shares of small and medium-sized companies and are not traded daily, the use of the share prices on a fixed date would have resulted in the exclusion of such shares from the study. Also, the prices at any particular point of time are liable to be affected by chance factors. Tests conducted by Gupta (1981)

have shown that the average of the high and low prices quite closely approximate the average based on more frequently collected price quotations, such as the daily, weekly or monthly prices.

Definition of Returns

The returns represent total returns, including both capital appreciation and dividends. They have been measured by deploying the method of internal rate of return (IRR).

The IRR is the discount rate 'r' in the following equation:

$$\text{Initial Purchase Price} = \left[D_1/(1+r)^1\right] + \left[D_2/(1+r)^2\right] + \cdots + [D_n + S_n/(1+r)^n] \quad (5.1)$$

where

r	is the discount rate;
$D_1, D_2, \ldots, D_n$	are the year-to-year cash dividends; and
S_n	is the terminal price on the sale of investment at the end of n years.

Bonus and Rights Issue Adjustments

Share prices and dividend data, used for computing the returns, have been adjusted for the bonus and rights issues made during the period of the study. For bonus issues, the adjustment is straightforward. For example, if a company issues 1:1 bonus, the prebonus price and dividend of one share should be compared with the post-bonus price and dividend on two shares combined. Hence, the post-bonus share prices and dividend rate in all subsequent years are multiplied by a 'bonus adjustment factor' (which is derived as the ratio of the number of shares after the bonus issue to the number of shares before the bonus issue). The bonus adjustment factor will be 2/1 in the case of 1:1 bonus issue and 3/1 in the case of 2:1 bonus issue. The adjustment factor is recalculated after every bonus issue.

In the case of a rights issue, the adjustment is relatively more difficult. The adjustment method is designed to keep the shareholder's investment after the rights issue unchanged, i.e. exactly the same as before the rights issue. Most rights issues are often made significantly below the prevailing market price. Every shareholder has the option either to subscribe to the rights issue or to sell his/her right to someone else. The rights are traded in the market in the same way as shares. If the investor subscribes to the right, he/she will be making an additional investment which has been ruled out for the present purpose. If he/she sells his/her right, the price realized by him/her has the effect of reducing his/her investment, even though he/she continues to hold the same number of shares as before the rights issue. The reduction occurs because the ex-right price is invariably lower than the cum-right price. As mentioned earlier, it is assumed that the investor keeps his/her investment

unchanged throughout the holding period. The 'rights adjustment factor' is intended to ensure this. It is derived by assuming that the shareholder first sells his 'right' and then immediately reinvests the sale proceeds by buying more shares of the company at the ex-right price. The assumption is that fractional shares can also be bought. The result of this is that the number of shares held by him/her will increase such that the value of his/her holding at the ex-right price will be the same as the value of his/her earlier holding at the cum-right price. For the detailed formulae and illustrative examples on bonus and rights issue adjustments, please refer to Annexure 4.1 of Chap. 4.

Weights for Computing Portfolio Returns

The returns over a year were first computed for each individual company, and then, weights were attached to each, based on the market capitalization of each company at the beginning of each year. Hence, the relative weights of the individual companies in the portfolio would vary from period to period. Even if the companies remain the same, the relative prices of their shares and, therefore, the relative weights could change from one period to another.

Dividends

Cash dividends are taken into account in the respective years and are not assumed to be reinvested.

Transaction Costs and Taxes

Brokerage, other transaction costs and personal income taxes have not been factored in the computation of returns. Whilst the reason for excluding brokerage and other transaction costs is logistic convenience, the reasons for income tax are two: first is that the personal income tax rates vary from investor to investor and second is that dividends were free of tax during part of the study period of 21 years.

Data Sources and Analysis

The relevant data (secondary) were collected from the Bloomberg® and AceEquity® databases, for fourteen years (2001–2014). Descriptive statistical values/positional values, i.e. mean, standard deviation, variance, coefficient of variation, minimum, maximum, skewness, kurtosis and quartile, have been computed for each holding period. The entire set of data has been analysed using Microsoft Excel® spreadsheets and the statistics software SPSS®, or Statistical Package for Social Sciences.

Table 5.1 Mean, minimum, maximum, standard deviation, coefficient of variation, skewness, kurtosis, median and quartile values related to the age of sample companies

Mean	41.04
Minimum	4
Maximum	151
Standard deviation	26.69
Coefficient of variation	65.03
Skewness	1.25
Kurtosis	1.29
Median	30.50
Quartile 1	22
Quartile 3	56

Figures are in years

Age

Table 5.1 presents the mean, minimum, maximum, standard deviation, coefficient of variation, skewness, kurtosis, median and quartile values related to the age of sample companies. The age was calculated with reference to the year of the incorporation of the company.

The constituent companies have been divided into 3 categories based on their age—'young', 'middle-aged' and 'old'. All companies that fall within the first quartile have been classified as 'young', companies that fall between the first and third quartiles as 'middle-aged' and those lying above the quartile 3 as 'old'. As a result of this classification, 122 companies fall in the 'old' category, 245 companies in the 'middle-aged' category and 133 companies in the 'young' category.

As per the table, the average age of the sample companies is around four decades. However, the median of 30.50 years indicates that around half of companies in the sample were incorporated around the time of the liberalization of the Indian economy in 1991 (more than two decades ago) and the subsequent emphasis placed on private (company) participation in the economy.

Size

Table 5.2 presents the mean, minimum, maximum, standard deviation, coefficient of variation, skewness, kurtosis, median and quartile values related to the size of sample companies. The market capitalization from 2001 to 2014, of each company, was taken to be the basis for the calculations.

The constituent companies have been divided into 3 categories based on their size—'small', 'medium' and 'large'. All companies that fall within the first quartile have been classified as 'small', companies between the first and third quartiles classified as 'medium' and those lying above the quartile 3 as 'large'.

As per the table, the average size of the sample companies (in terms of market capitalization) is around INR one lakh crores. However, the much lower median of INR 20,917.75 crores indicates that around half of companies in the sample are

Table 5.2 Mean, minimum, maximum, standard deviation, coefficient of variation, skewness, kurtosis, median and quartile values related to the size of sample companies

Mean	92,993.30
Minimum	663.67
Maximum	2,622,377.78
Standard deviation	247,119.11
Coefficient of variation	265.74
Skewness	5.96
Kurtosis	44.61
Median	20,917.75
Quartile 1	9843.24
Quartile 3	58,529.66

Figures are in INR crores

significantly smaller. The same is also corroborated by the high skewness and higher kurtosis that indicates that the sample is dominated a small number of very large companies. For example, Reliance Industries is the largest company in the sample, with an average market capitalization over 2001–2014 of INR 2,622,377.78 crores, more than 26 times the average!

Ownership Structure

The ownership structure of the sample companies has been determined as follows: family-owned companies and non-family-owned companies. From the non-family-owned companies, a further segregation on the basis of whether these companies are public sector undertakings (PSUs) or not has been made. Therefore, the segregation of the sample companies on the basis of ownership structure is 'family-owned', 'PSUs' and 'non-PSU/non-family'.

In terms of numbers, there are 351 (70.20 %) family-owned businesses, 39 (7.80 %) PSUs and 110 (22 %) non-family/non-PSU companies in the sample. As a result, more than three-fourth (78 %) of the NSE 500 companies are either family-owned or government-owned businesses and less than one-fourth are non-family corporates.

Underlying Sector/Industry Affiliation

For the purpose of the disaggregative analysis, the 500 companies were regrouped into constituent sectors to reduce the number of sectors to 10 from 73, primarily for the sake of providing an adequate/good number of companies in each sector and for the sake of better statistical analysis. The detailed segregation is provided in Table 5.3.

Table 5.3 Sector-wise reclassification of sample companies

Sectors	Number of companies	Percentage of companies
Commodity (metal, metal products, mining, oil and gas)	*53*	*10.60*
Aluminium	2	
Castings/forgings	2	
Gas	6	
Metals	1	
Mining	8	
Oil exploration/production	6	
Refineries	7	
Refractories	1	
Steel and steel products	19	
Sector not available	1	
Consumer goods	*40*	*8.00*
Air conditioners	1	
Brew/distilleries	3	
Cigarettes	3	
Consumer durables	4	
Gems jewellery and watches	4	
Leather and leather products	1	
Retail	1	
Personal care	7	
Plastic and plastic products	8	
Sugar	5	
Tea and coffee	3	
Finance	*76*	*15.20*
Banks	36	
Finance	31	
Finance—housing	4	
Financial institution	4	
Stock broking/trading	1	
Health care	*36*	*7.20*
Hospitals	3	
Pharmaceuticals	33	
ICT (Internet, communications and technology)	*42*	*8.40*
Computers—hardware	1	
Computers—software	29	
Telecommunication—equipment	2	
Telecommunication—services	7	
Transmission towers	3	

(continued)

Table 5.3 (continued)

Sectors	Number of companies	Percentage of companies
Infrastructure	*59*	*11.80*
Cement and cement products	12	
Construction	47	
Power and electricals	*51*	*10.20*
Cables—power	1	
Compressors/pumps	4	
Electrical equipment	12	
Electrodes	3	
Electronics—industrial	2	
Electrical engineering	8	
Fasteners	1	
Power generation	19	
Electricity trading	1	
Transport	*52*	*10.40*
Auto ancillaries	14	
Automobiles—2 and 3 wheelers	3	
Automobiles—4 wheelers	6	
Bearings	2	
Cycles	1	
Diesel engines	3	
Shipping	8	
Travel and transport	10	
Tyres	5	
Textile and chemicals	*50*	*10.00*
Abrasives	1	
Chemicals—inorganic	6	
Chemicals—organic	2	
Chemicals—specialty	4	
Dyes and pigments	1	
Fertilizers	5	
Paints	4	
Pesticides and agrochemicals	4	
Petrochemicals	3	
Solvent extraction	3	
Textile machinery	1	
Textile products	10	
Textiles—cotton	1	
Textiles—synthetic	5	

(continued)

Table 5.3 (continued)

Sectors	Number of companies	Percentage of companies
Miscellaneous	*41*	*8.20*
Sanitary ware	1	
Diversified	2	
Food and food processing	9	
Hotels	4	
Entertainment	9	
Education	1	
Packaging	6	
Roses	1	
Apparel	1	
Paper and paper products	3	
Printing and publishing	3	
Total	500	100

Section IV: Returns Based on the Age, Size, Ownership Structure and Underlying Sector/Industry Affiliation of Sample Companies

This section presents the disaggregated returns of the sample companies on the basis of their age, size, ownership structure and underlying sector/industry affiliation.

Age

As has already been mentioned, the companies have been segregated into young, middle-aged and old. Table 5.4 presents the weighted annual average returns from 2001 to 2014 for the different classifications of age and the statistics of mean, standard deviation, variance, coefficient of variation, minimum, maximum, skewness, kurtosis and quartile values of returns.

On the basis of age, the 'young' companies with mean returns of 43.33 % fare far better than their 'middle-aged' and 'old' counterparts with mean returns of 33.72 and 31.10 %, respectively. This is perhaps to be expected, as the companies in this segment have been observed to be affiliated with emerging and important sectors for India, such as power and infrastructure. Additionally, being new, these companies are equipped with new technologies, with new production processes and perhaps also with skilled labour force. There appears to be a negative correlation between age and returns. The old companies seem to be saddled with 'old' technologies, old machines, more labour force (and that too relatively less skilled) and

Table 5.4 Weighted annual average returns and statistics of mean, standard deviation, variation, coefficient of variation, skewness, kurtosis and quartile values of returns on the basis of age of sample companies, 2001–2014

Year	Weighted average annual returns	Mean returns	Standard deviation	Variance	Coefficient of variation	Minimum returns	Maximum returns	Skewness	Kurtosis	Lower quartile	Upper quartile
Young											
2001	−21.68	−6.34	20.19	407.63	−318.45	−91.44	8.30	−3.09	8.71	0.00	0.00
2002	15.59	8.39	58.77	3454.19	700.48	−62.86	560.33	8.35	77.34	0.00	0.00
2003	−3.84	−1.48	11.61	134.74	−784.46	−81.01	42.31	−3.24	23.76	0.00	0.00
2004	233.79	38.20	97.50	9506.97	255.24	−14.56	546.91	3.19	10.99	0.00	1.14
2005	116.32	62.48	400.79	160630.33	641.47	−17.45	459.45	9.80	98.64	0.00	6.73
2006	53.94	23.03	50.07	2506.83	217.41	−20.01	257.76	2.64	7.54	0.00	25.57
2007	37.38	11.04	34.58	1195.82	313.22	−68.81	211.11	2.51	11.06	0.00	15.06
2008	24.54	20.15	50.47	2547.12	250.47	−62.55	269.16	2.04	6.57	0.00	37.55
2009	−35.25	−35.32	28.92	836.19	−81.88	−85.67	9.71	0.01	−1.35	−59.61	0.00
2010	125.71	125.14	118.42	14023.94	94.63	−5.03	525.56	1.09	0.89	29.51	189.71
2011	14.84	2.46	38.99	1520.25	1584.96	−73.98	195.63	1.70	5.30	−24.84	18.53
2012	1.06	−7.45	32.11	1031.29	−431.01	−77.25	111.35	0.67	1.32	−25.74	9.30
2013	18.58	2.09	40.49	1639.07	1937.32	−70.25	213.50	2.04	7.97	−19.70	18.30
2014	25.61	15.36	39.86	1588.94	259.51	−55.37	188.47	1.50	3.88	−6.41	29.69
Average	43.33	18.41	73.06	14358.81	331.35	−56.16	257.11	2.09	18.76	−7.63	25.11
Middle-aged											
2001	−18.13	−10.41	55.48	3078.22	253.68	−89.01	530.09	5.33	45.95	−37.81	0.00
2002	15.10	19.04	48.30	2333.09	490.47	−67.63	339.26	2.37	10.10	−2.15	33.01
2003	1.01	8.08	39.63	1570.78	123.47	−82.81	223.58	1.91	6.95	−6.15	14.75
2004	142.05	108.55	134.03	17965.33	346.29	0.00	732.43	2.12	5.58	3.32	158.98

(continued)

Table 5.4 (continued)

Year	Weighted average annual returns	Mean returns	Standard deviation	Variance	Coefficient of variation	Minimum returns	Maximum returns	Skewness	Kurtosis	Lower quartile	Upper quartile
2005	61.67	85.14	294.83	86924.38	126.48	−31.53	708.55	12.18	163.72	0.60	89.38
2006	75.49	75.19	95.10	9044.22	738.89	−34.31	747.58	2.63	12.47	1.45	106.00
2007	43.65	17.95	132.63	17590.04	263.12	−67.34	802.61	10.03	114.93	−15.09	14.18
2008	44.12	28.85	75.91	5762.32	−68.32	−55.95	636.77	3.73	22.54	−10.25	49.63
2009	−27.05	−40.84	27.90	778.55	67.56	−87.03	54.01	0.64	0.04	−63.76	−19.93
2010	105.74	156.05	105.43	11115.43	362.49	−46.03	642.00	1.23	3.10	82.81	213.95
2011	7.13	11.33	41.07	1686.73	−1247.47	−63.38	229.38	1.44	4.28	−15.62	30.34
2012	−7.19	−2.57	32.06	1027.74	−1886.47	−73.49	160.91	1.35	4.15	−24.82	14.39
2013	5.13	−1.70	32.07	1028.19	181.57	−75.80	96.56	0.50	0.29	−26.08	17.23
2014	23.42	26.05	47.30	2237.73	253.68	−90.47	237.21	1.18	2.88	−1.63	51.22
Average	33.72	34.34	82.98	11581.63	−55.80	−61.77	438.64	3.33	28.36	−8.23	55.22
Old											
2001	−32.45	−6.79	33.10	1095.62	−487.48	−89.22	120.18	0.47	1.71	−26.26	9.27
2002	24.04	20.90	37.23	1386.03	178.13	−28.57	161.18	1.70	2.82	0.00	29.57
2003	−3.80	12.83	34.78	1209.48	271.08	−55.00	203.50	1.78	7.68	−5.07	32.75
2004	124.35	123.72	108.53	11777.96	87.72	0.00	485.21	1.00	0.75	32.53	185.00
2005	54.40	65.00	87.25	7613.18	134.23	−36.97	467.47	1.89	4.32	3.97	99.94
2006	72.92	73.26	76.89	5911.48	104.95	−23.41	382.93	1.43	2.69	9.62	115.93
2007	8.28	−4.26	26.52	703.28	−622.54	−61.16	89.59	1.02	1.63	−20.96	3.33
2008	37.15	24.37	39.13	1531.20	160.57	−73.84	153.61	0.80	1.42	0.32	45.25
2009	−16.39	−34.10	26.99	728.44	−79.15	−84.24	30.01	0.31	−0.69	−56.28	−14.05
2010	110.67	150.43	106.49	11341.03	70.79	0.00	635.95	1.81	5.49	82.61	188.94

(continued)

Table 5.4 (continued)

Year	Weighted average annual returns	Mean returns	Standard deviation	Variance	Coefficient of variation	Minimum returns	Maximum returns	Skewness	Kurtosis	Lower quartile	Upper quartile
2011	26.17	20.31	43.91	1928.42	216.20	−69.13	259.32	1.94	8.77	−3.18	40.49
2012	3.24	−2.86	31.18	972.50	−1090.21	−62.88	129.51	1.18	2.83	−22.94	12.73
2013	7.38	−3.62	27.43	752.27	−757.73	−48.53	83.91	0.80	0.58	−24.43	12.03
2014	19.42	13.33	33.90	1148.94	254.31	−39.47	160.79	1.34	3.28	−8.27	27.31
Average	31.10	32.32	50.95	3435.70	−111.37	−48.03	240.23	1.25	3.09	−2.74	56.32

so on. Nevertheless, the returns for all 3 segments are commendable. Further, it is worth noting that the returns for all-age companies are subject to very high volatility reflected in the high standard deviation and coefficient of variation. The high kurtosis figure in each segment is an indication of a small number of companies recording very high returns.

In terms of stability of returns though, the 'old' companies, with an upper quartile value of 56.32 %, appear safer. The negative returns in 2001 for all classifications of age may be attributed to the global economic slowdown in the wake of the 9/11 terrorist attack in the USA. The returns were negative in 2009 as a result of the recession emanating from the financial crisis in the USA in 2008; however, all 3 segregations recovered admirably in 2010, with returns exceeding 100 %. According to the Organization for Economic Cooperation and Development (OECD), India's growth rate languished below 5 % in 2011 and 2012, due to high interest rates, high inflation and weak investment (OECD India Brochure 2012). The same perhaps is reflected in the significant lowering of returns in 2011 and 2012. However, returns appear to have recovered, 2013 onwards.

In 2014, amongst the 'young' companies, BF Utilities has recorded high returns, whilst Unity Infraprojects has recorded low returns. Ironically, both companies belong to the 'infrastructure' sector, perhaps an indication of the volatility available within the sector. Amongst the 'middle-aged' and 'old' companies, Aurobindo Pharma and Monsanto India recorded high returns, respectively.

Size

This subsection presents the analysis of returns on the basis of size through Table 5.5.

The 'small' and 'medium'-sized companies fare better (at robust returns of 40 %) than their 'large' counterparts by 10 percentage points. In other words, the small and medium capitalization (cap) companies lead the returns compared to large cap companies. This may be attributed to the aspect that they are growth companies with increasing market share, whilst the large companies are mature companies with low further growth or expansion opportunities. As is perhaps expected, volatility remains evident in these segments as well. The findings are similar to the findings of Banz (1981), Wong and Lye (1990), Lau et al. (2002) and Manjunatha and Mallikarjunappa (2012). These apparent 'age' and 'size' anomalies are also indicative of the status of market efficiency. The aspect of market efficiency has been explored further in Chap. 8.

Tata Elxsi recorded high returns in the 'small' segment, whilst Aurobindo Pharma recorded high returns in the 'medium'-sized segment, as well. Amongst the 'large' companies, Reliance Communications recorded high returns.

Table 5.5 Weighted annual average returns and statistics of mean, standard deviation, variation, coefficient of variation, skewness, kurtosis and quartile values of returns on the basis of size of sample companies, 2001−2014

Year	Weighted average annual returns	Mean returns	Standard deviation	Variance	Coefficient of variation	Minimum returns	Maximum returns	Skewness	Kurtosis	Lower quartile	Upper quartile
Small											
2001	−19.55	−8.97	23.53	553.81	−262.32	−91.44	42.84	−1.24	1.57	−21.66	0.00
2002	41.03	10.58	56.11	3148.71	530.34	−50.06	560.33	7.84	75.28	0.00	8.52
2003	15.67	8.15	29.39	864.04	360.61	−54.72	148.00	2.12	7.67	0.00	10.19
2004	87.95	51.59	99.75	9949.35	193.35	−14.56	660.08	3.21	13.17	0.00	66.09
2005	99.94	47.05	93.13	8672.96	197.94	−43.79	629.20	3.67	18.02	0.00	70.41
2006	75.75	39.57	71.22	5072.17	179.98	−40.69	344.48	2.17	4.86	0.00	67.98
2007	8.6	−0.08	36.72	1348.45	−45900.00	−77.70	240.79	2.67	14.65	−20.70	1.73
2008	26.16	12.81	51.93	2696.37	405.39	−76.38	252.94	2.32	7.47	−7.64	20.07
2009	−43.23	−39.03	27.81	773.24	−71.25	−82.49	14.68	0.34	−1.25	−62.30	−12.84
2010	165.86	137.86	130.27	16969.38	94.49	0.00	642.00	1.32	2.19	33.57	191.39
2011	14.92	6.08	41.89	1754.60	688.98	−55.88	229.38	1.94	6.91	−20.21	23.03
2012	1.51	0.01	34.88	1216.88	348800.00	−53.03	150.24	1.65	4.55	−22.36	14.73
2013	22.69	12.69	47.58	2264.11	374.94	−59.14	200.31	1.96	4.54	−16.22	25.71
2014	66.23	45.73	78.79	6208.09	172.29	−53.23	513.24	3.04	13.85	−1.03	73.33
Average	40.25	23.15	58.79	4392.30	21840.34	−53.79	330.61	2.36	12.39	−9.90	40.02
Medium											
2001	−20.04	−1.51	65.93	4346.65	−4366.23	−85.93	616.14	6.96	62.92	−20.12	0.00
2002	32.07	16.49	39.11	1529.95	237.17	−52.44	176.17	1.80	3.54	0.00	27.25
2003	12.28	7.82	35.98	1294.60	460.10	−81.46	203.50	2.43	11.27	0.00	12.69
2004	165.86	106.96	147.35	21710.57	137.76	0.00	732.43	1.99	4.59	0.00	155.68

(continued)

Table 5.5 (continued)

Year	Weighted average annual returns	Mean returns	Standard deviation	Variance	Coefficient of variation	Minimum returns	Maximum returns	Skewness	Kurtosis	Lower quartile	Upper quartile
2005	75.57	49.05	74.77	5590.14	152.44	−25.93	312.90	1.81	2.92	0.00	83.99
2006	84.89	61.73	88.76	7877.99	143.79	−22.49	435.43	1.76	3.42	0.00	100.36
2007	15.8	19.50	150.36	22609.51	771.08	−68.81	1639.70	10.19	110.11	−6.58	10.26
2008	40.71	26.52	55.42	3070.87	208.97	−55.95	385.93	3.30	16.46	0.00	41.87
2009	−41.82	−37.00	27.80	773.08	−75.14	−85.83	30.01	0.09	−1.01	−63.27	−12.95
2010	156.74	136.59	100.34	10068.80	73.46	−1.39	493.06	0.74	0.49	66.33	198.63
2011	11.31	11.57	42.49	1805.07	367.24	−73.98	195.63	1.17	2.73	−17.74	32.60
2012	3.39	−2.29	36.99	1368.33	−1615.28	−73.49	160.91	1.25	2.90	−27.51	14.56
2013	8.04	−4.36	36.21	1311.40	−830.50	−75.80	142.88	0.95	2.21	−28.15	15.24
2014	27.75	18.13	49.74	2474.21	274.35	−55.37	237.21	1.71	4.42	−11.86	40.21
Average	40.90	29.23	67.95	6130.80	−290.06	−54.21	411.56	2.58	16.21	−7.78	51.46
Large											
2001	−23.67	−7.99	33.00	1089.19	−413.02	−89.22	143.00	0.96	5.50	−24.51	0.00
2002	27.95	20.25	43.26	1871.03	213.63	−45.35	161.93	1.74	2.45	0.00	27.61
2003	−0.96	4.30	28.65	820.99	666.28	−61.65	121.42	1.45	4.10	−6.24	9.23
2004	141.92	116.28	125.60	15775.06	108.02	0.00	671.38	1.57	3.49	0.00	180.83
2005	36.87	67.46	364.41	132793.12	540.19	−36.97	4068.89	10.55	116.04	0.00	46.32
2006	70.34	63.82	84.23	7094.36	131.98	−23.41	747.58	4.43	33.22	0.25	95.35
2007	29.38	14.36	77.33	5979.26	538.51	−45.36	802.61	8.64	86.10	−10.32	20.07
2008	35.67	31.87	53.39	2850.74	167.52	−68.62	335.53	2.00	7.80	0.00	60.99
2009	−25.52	−29.28	27.66	765.08	−94.47	−87.03	54.01	0.26	−0.23	−52.43	−6.21
2010	100.76	121.27	88.26	7789.87	72.78	−46.03	412.63	1.02	1.39	64.42	168.65

(continued)

Table 5.5 (continued)

Year	Weighted average annual returns	Mean returns	Standard deviation	Variance	Coefficient of variation	Minimum returns	Maximum returns	Skewness	Kurtosis	Lower quartile	Upper quartile
2011	12.22	11.59	31.79	1010.83	274.29	−45.85	149.37	1.04	2.97	−10.68	29.63
2012	−3.63	−3.77	23.51	552.73	−623.61	−53.55	83.41	0.40	0.47	−20.81	12.70
2013	11.22	5.11	38.40	1474.53	751.47	−74.66	235.22	2.89	15.36	−16.03	19.21
2014	20.77	14.75	30.07	904.21	203.86	−75.21	125.94	0.55	2.56	−0.22	27.26
Average	30.95	30.72	74.97	12912.21	181.25	−53.78	579.49	2.68	20.09	−5.47	49.40

Ownership Structure

This subsection presents the analysis of returns on the basis of ownership structure through Table 5.6.

As stated earlier, the ownership structure of the Indian corporates is dominated by 'family-owned' businesses and their mean returns at 36.92 % are also the highest amongst the three segments. Amongst the PSUs, the high kurtosis figures indicate that the returns are high for only a small number of PSUs. The 'non-PSU/non-family' segment has the lowest returns. Therefore, they appear unattractive, as an investment choice. The 'family-owned' and 'PSU' segments thus, not surprisingly, continue to be popular choices for equity investors.

Aurobindo Pharma, with a majority shareholding of the Reddy family, recorded high returns, whilst Bharat Earth Movers Limited (BEML), a PSU, recorded high returns. Monsanto India recorded high returns in the non-PSU/non-family segment.

Underlying Sector/Industry Affiliation

This subsection presents the analysis of returns on the basis of underlying sector/industry affiliation through Table 5.7.

Amongst the underlying sectors, the 'transport' and 'infrastructure' sectors recorded high returns of more than 40 %. There is evidence of high volatility (standard deviation, variance and coefficient of variation) amongst the sectors. However, relatively low skewness figures indicate a near-normal distribution of returns, within the sectors.

Bharat Forge in the 'commodities' sector, Finolex in the 'consumer goods' sector, Indiabulls Securities in the 'finance' sector, Aurobindo Pharma in the 'healthcare' sector, Tata Elxsi in the 'ICT' sector, BF Utilities in the 'infrastructure' sector, Kajaria Ceramics in the 'miscellaneous' sector, Finolex Cables in the 'power' sector, TVS Motor Company in the 'transport' sector and Monsanto India in the 'textiles' sector recorded high returns.

Section V: Summary

This chapter presents a disaggregative analysis of the returns of the sample companies on the basis of age, size, ownership structure and underlying sector. Written on the lines of the chapter on market returns(computed on an aggregative basis), the objective of this chapter was to enrich the understanding of the reader/investor on equity returns and on disaggregative parameters such as age, size, ownership structure and underlying sector/industry affiliation.

Table 5.6 Weighted annual average returns and statistics of mean, standard deviation, variation, coefficient of variation, skewness, kurtosis and quartile values of returns on the basis of ownership structure of sample companies, 2001−2014

Year	Weighted average annual returns	Mean returns	Standard deviation	Variance	Coefficient of variation	Minimum returns	Maximum returns	Skewness	Kurtosis	Lower quartile	Upper quartile
Family-owned											
2001	−23.36	−10.67	36.93	1362.79	−346.11	−89.01	225.78	1.90	11.88	−27.96	0.00
2002	17.71	12.59	39.97	1597.31	317.47	−67.63	339.26	3.02	17.14	0.00	18.32
2003	−7.5	5.60	34.10	1162.60	608.93	−82.81	223.58	2.28	10.68	−0.67	9.53
2004	158.5	90.75	131.15	17199.70	144.52	−14.56	732.43	2.20	5.72	0.00	124.80
2005	61.75	72.36	255.30	65179.29	352.82	−31.53	708.55	13.55	210.13	0.00	85.61
2006	79.56	61.96	84.48	7136.83	136.35	−34.31	747.58	2.80	15.55	0.00	97.82
2007	41.88	15.57	113.94	12981.82	731.79	−68.61	802.61	11.37	151.61	−11.83	14.83
2008	39.96	25.66	69.40	4816.92	270.46	−68.62	636.77	3.77	24.30	−6.01	40.64
2009	−34.96	−41.12	28.20	795.49	−68.58	−87.03	54.01	0.54	−0.39	−63.85	−20.93
2010	129.25	154.85	116.36	13538.50	75.14	−46.03	642.00	1.30	2.75	75.51	205.42
2011	13.43	9.14	45.02	2026.38	492.56	−73.98	259.32	1.79	6.04	−18.38	29.00
2012	−0.88	−4.12	32.82	1077.43	−796.60	−77.25	130.25	0.79	1.35	−26.73	13.33
2013	12.84	−0.42	35.52	1261.96	−8457.14	−73.23	213.50	1.24	4.56	−26.93	19.80
2014	28.72	21.89	44.98	2023.05	205.48	−90.47	237.21	1.34	3.46	−5.30	42.00
Average	36.92	29.57	76.30	9440.01	−452.35	−64.65	425.20	3.42	33.20	−8.01	48.58
PSU											
2001	8.83	5.61	28.14	791.89	501.60	−47.52	120.18	1.81	7.08	−5.36	15.44
2002	72.65	44.37	53.50	2862.51	120.58	−15.04	161.93	0.93	−0.45	0.00	80.97
2003	15.61	15.79	43.28	1873.22	274.10	−44.46	203.50	2.58	9.21	−3.53	19.59
2004	160.77	129.94	104.89	10855.50	80.72	0.00	386.44	0.50	−0.21	18.45	194.31

(continued)

Table 5.6 (continued)

Year	Weighted average annual returns	Mean returns	Standard deviation	Variance	Coefficient of variation	Minimum returns	Maximum returns	Skewness	Kurtosis	Lower quartile	Upper quartile
2005	15.07	26.60	47.65	2270.33	179.14	−36.97	196.61	1.75	3.56	0.00	38.05
2006	56.37	35.00	59.53	3543.34	170.09	−23.41	280.30	2.59	7.95	0.03	47.25
2007	3.74	−2.99	17.65	311.47	−590.30	−45.36	40.18	0.16	0.75	−16.23	4.19
2008	42.09	29.71	35.63	1269.51	119.93	−27.07	139.47	1.00	1.01	1.22	54.16
2009	−17.10	−21.55	19.72	388.73	−91.51	−66.78	7.51	−0.42	−0.59	−37.62	−6.06
2010	71.74	100.67	75.73	5734.32	75.23	0.00	327.40	0.83	0.99	42.17	149.17
2011	8.46	12.43	27.39	750.20	220.35	−34.15	62.98	0.11	−0.96	−11.40	34.28
2012	−11.88	−17.00	15.34	235.40	−90.24	−44.65	17.79	0.48	0.12	−28.16	−9.58
2013	−0.73	−13.23	18.35	336.59	−138.70	−75.80	19.09	−0.93	2.23	−27.41	1.33
2014	2.70	−1.30	25.96	674.04	−1996.92	−43.20	91.17	1.32	3.36	−20.56	9.49
Average	30.59	24.58	40.91	2278.36	−83.28	−36.03	146.75	0.91	2.43	−6.31	45.19
Non-family/non-PSU											
2001	−42.48	−7.13	63.15	3987.38	−885.69	−91.44	530.09	6.83	58.56	−29.64	0.00
2002	1.98	19.58	66.09	4368.02	337.54	−31.78	560.33	6.39	50.16	−1.64	27.34
2003	−5.20	7.49	27.38	749.39	365.55	−55.19	79.10	0.49	0.42	−1.71	18.51
2004	80.50	92.71	104.06	10828.20	112.24	0.00	433.08	1.30	1.41	3.36	145.01
2005	43.28	54.65	76.56	5861.82	140.09	−13.71	467.47	2.58	9.31	1.52	73.44
2006	79.02	71.26	89.44	7999.62	125.51	−15.43	388.19	1.72	2.99	0.67	107.30
2007	14.95	−1.03	27.80	772.90	−2699.03	−58.50	95.34	0.93	1.46	−21.79	10.08
2008	24.58	22.12	47.10	2218.35	212.93	−73.84	248.22	1.95	6.88	0.00	43.12
2009	−26.43	−32.81	27.64	763.92	−84.24	−83.77	37.96	0.28	−0.77	−55.67	−10.68
2010	115.74	138.43	96.34	9281.81	69.59	0.00	455.87	0.73	0.35	68.73	190.25

(continued)

Table 5.6 (continued)

Year	Weighted average annual returns	Mean returns	Standard deviation	Variance	Coefficient of variation	Minimum returns	Maximum returns	Skewness	Kurtosis	Lower quartile	Upper quartile
2011	19.80	16.93	34.88	1216.89	206.02	−51.77	149.54	0.85	1.59	−4.15	40.43
2012	3.64	1.14	32.57	1060.64	2857.02	−54.05	160.91	1.94	7.35	−18.94	17.49
2013	14.87	1.61	31.09	966.83	1931.06	−58.19	131.75	1.20	3.06	−17.86	15.45
2014	22.20	24.17	38.98	1519.15	161.27	−52.36	160.79	1.14	2.05	1.81	45.51
Average	24.75	29.22	54.51	3685.35	203.56	−45.72	278.47	2.02	10.34	−5.38	51.66

Table 5.7 Weighted annual average returns and statistics of mean, standard deviation, variation, coefficient of variation, skewness, kurtosis and quartile values of returns on the basis of underlying sector of sample companies, 2001−2014

Year	Weighted average annual returns	Mean returns	Standard deviation	Variance	Coefficient of variation	Minimum returns	Maximum returns	Skewness	Kurtosis	Lower quartile	Upper quartile
Commodities											
2001	8.82	10.83	58.13	3379.36	536.75	−67.05	225.78	2.59	7.51	−13.91	12.17
2002	70.19	22.99	44.92	2018.14	195.39	−67.63	182.78	1.35	2.70	0.00	54.17
2003	12.69	22.05	53.38	2849.76	242.09	−54.67	223.58	1.93	4.32	0.00	22.05
2004	3.33	97.83	122.02	14887.71	124.73	0.00	549.40	1.65	3.40	1.08	173.63
2005	72.74	152.39	620.14	384574.40	406.94	−36.97	554.41	6.29	40.48	0.00	88.12
2006	39.31	34.97	59.10	3493.06	169.00	−34.31	291.81	2.45	8.17	0.00	51.56
2007	2.96	4.33	38.19	1458.83	881.99	−48.91	178.18	2.57	9.60	−17.90	18.04
2008	52.12	83.36	120.83	14599.28	144.95	−38.57	636.77	2.75	9.88	12.72	108.02
2009	−29.29	−44.28	26.68	711.90	−60.25	−85.83	6.96	0.47	−1.08	−65.36	−18.51
2010	120.71	174.82	123.68	15295.57	70.75	0.00	493.06	0.66	0.11	84.53	251.70
2011	4.06	−4.05	26.43	698.51	−652.59	−62.41	55.73	−0.11	−0.33	−24.27	14.54
2012	−10.55	−17.16	23.18	537.41	−135.08	−54.05	35.66	0.56	−0.45	−34.63	−4.49
2013	−2.06	−20.94	20.03	401.21	−95.65	−61.60	19.09	−0.01	−0.62	−35.35	−5.79
2014	12.19	13.62	35.50	1259.93	260.65	−56.46	107.98	0.57	0.68	−8.19	25.72
Average	25.52	37.91	98.02	31868.93	149.26	−47.75	254.37	1.69	6.03	−7.23	56.50
Consumer goods											
2001	−2.35	−14.80	30.21	912.38	−204.12	−78.60	58.36	−0.47	0.36	−32.06	2.66
2002	−6.75	5.99	27.87	776.73	465.28	−45.35	109.82	1.77	5.04	−6.21	8.84
2003	−6.73	1.18	28.01	784.39	2373.73	−55.00	74.52	0.49	0.41	−16.91	14.49
2004	84.14	84.39	93.23	8692.21	110.48	0.00	485.21	2.54	9.45	4.47	118.02
2005	55.51	104.57	141.66	20067.52	135.47	0.00	708.55	2.64	9.00	4.98	136.57

(continued)

Table 5.7 (continued)

Year	Weighted average annual returns	Mean returns	Standard deviation	Variance	Coefficient of variation	Minimum returns	Maximum returns	Skewness	Kurtosis	Lower quartile	Upper quartile
2006	118.45	102.21	81.66	6668.22	79.89	0.00	259.15	0.26	−1.05	22.79	163.69
2007	9.61	35.01	280.73	78810.60	801.86	−68.81	67.58	5.82	34.18	−27.47	3.86
2008	51.17	31.70	69.38	4813.99	218.86	−30.31	385.93	4.17	20.72	0.00	40.37
2009	−17.06	−32.33	29.22	853.77	−90.38	−83.07	23.45	−0.03	−1.14	−58.89	−7.50
2010	98.21	180.30	153.00	23409.07	84.86	0.00	635.95	1.99	3.68	93.46	181.43
2011	37.87	36.87	64.89	4210.17	176.00	−45.89	259.32	1.69	3.22	−0.71	53.27
2012	20.39	5.94	42.47	1803.74	714.98	−53.47	129.51	0.76	0.91	−25.56	30.72
2013	40.78	15.81	49.93	2493.06	315.81	−45.09	213.50	1.96	6.16	−17.32	31.00
2014	17.28	13.71	34.71	1204.74	253.17	−90.47	98.26	−0.15	1.83	−7.56	27.78
Average	35.75	40.75	80.50	11107.19	388.28	−42.58	250.65	1.67	6.63	−4.79	57.51
Finance											
2001	3.92	2.55	26.96	726.76	1057.25	−64.09	136.50	1.61	8.37	−1.27	6.39
2002	29.90	25.48	42.87	1838.08	168.25	−23.52	149.40	1.60	1.74	0.00	34.77
2003	18.83	15.86	33.24	1105.14	209.58	−14.89	203.50	3.23	14.18	0.00	15.21
2004	141.14	86.85	92.25	8509.78	106.22	0.00	357.56	1.06	0.71	0.00	138.07
2005	32.58	31.11	52.12	2716.36	167.53	−25.93	247.93	2.49	6.70	0.00	36.90
2006	50.75	25.94	49.16	2417.09	189.51	−40.69	215.89	1.91	3.65	0.00	39.28
2007	19.66	13.16	37.08	1374.90	281.76	−46.49	211.11	2.66	10.95	−3.95	27.09
2008	35.72	31.56	42.66	1819.86	135.17	−68.62	189.47	1.45	3.96	0.56	27.09
2009	−33.79	−34.60	24.74	612.26	−71.50	−84.45	9.52	0.01	−0.85	−53.29	−15.03
2010	129.71	128.18	93.26	8697.01	72.76	0.00	412.63	1.09	1.25	78.42	174.03
2011	28.36	26.59	34.36	1180.74	129.22	−37.59	149.37	0.94	2.03	2.16	43.07
2012	−7.45	−8.77	23.47	550.61	−267.62	−77.25	57.68	0.06	1.62	−22.19	7.37

(continued)

Table 5.7 (continued)

Year	Weighted average annual returns	Mean returns	Standard deviation	Variance	Coefficient of variation	Minimum returns	Maximum returns	Skewness	Kurtosis	Lower quartile	Upper quartile
2013	11.15	6.07	24.87	618.49	409.72	−47.50	70.45	0.20	−0.38	−13.49	23.83
2014	9.01	4.41	29.17	851.14	661.45	−57.24	121.06	1.10	3.24	−13.93	16.35
Average	33.54	25.31	43.30	2358.44	232.09	−42.02	180.86	1.39	4.08	−1.93	41.03
Health care											
2001	−11.11	−14.36	34.96	1222.31	−243.45	−75.14	79.58	0.46	0.71	−42.41	0.83
2002	4.47	11.95	41.14	1692.55	344.27	−62.86	119.60	1.11	1.15	−8.91	26.14
2003	−14.77	−1.15	45.28	2050.14	−3937.39	−81.01	190.29	2.87	11.73	−20.59	0.00
2004	179.33	170.49	170.87	29196.40	100.22	0.00	701.22	1.37	2.17	28.11	268.21
2005	33.83	38.78	74.39	5533.81	191.83	−31.53	295.68	2.52	6.75	0.00	45.34
2006	84.31	60.92	46.08	2123.68	75.64	0.00	172.84	0.69	0.09	25.37	90.30
2007	11.71	9.29	39.42	1553.78	424.33	−33.85	112.16	1.37	1.11	−15.58	15.50
2008	13.28	−2.07	36.04	1298.65	−1741.06	−55.95	106.65	1.22	1.99	−24.29	10.53
2009	−8.96	−18.65	31.19	972.79	−167.24	−69.56	42.12	0.16	−0.85	−42.13	8.60
2010	127.52	155.56	118.03	13931.17	75.87	44.64	525.56	1.69	2.63	73.88	189.16
2011	17.50	12.57	31.11	968.06	247.49	−50.88	92.34	0.21	1.40	0.71	28.84
2012	13.12	1.70	29.10	847.06	1711.76	−53.31	69.14	0.23	0.24	−25.02	14.42
2013	25.15	11.63	35.66	1271.41	306.62	−70.25	58.70	−1.07	0.70	−1.78	32.92
2014	41.45	32.75	49.01	2402.30	149.65	−55.37	237.21	2.48	10.71	2.34	48.87
Average	36.92	33.53	55.88	4647.44	−175.82	−42.51	200.22	1.09	2.90	−3.59	55.69
ICT											
2001	−62.10	−31.32	36.48	1330.84	−116.48	91.44	0.00	−0.53	−1.50	−69.97	0.00
2002	10.19	27.48	116.83	13649.70	425.15	−63.70	560.33	3.76	14.98	−3.84	0.55
2003	−12.17	−8.94	26.25	688.83	−293.62	−82.81	62.41	−0.57	2.28	−23.06	0.00

(continued)

Table 5.7 (continued)

Year	Weighted average annual returns	Mean returns	Standard deviation	Variance	Coefficient of variation	Minimum returns	Maximum returns	Skewness	Kurtosis	Lower quartile	Upper quartile
2004	141.11	86.99	181.57	32967.62	208.73	−14.56	32.43	2.72	7.02	0.00	80.12
2005	37.85	50.69	99.66	9931.39	196.61	−17.45	516.34	3.49	14.97	0.00	81.41
2006	61.94	46.17	71.71	5142.38	155.32	−1.93	301.52	2.07	4.47	0.00	71.00
2007	36.44	20.56	34.90	1218.08	169.75	−23.00	37.05	1.58	2.66	0.00	36.35
2008	−4.75	−7.56	41.68	1736.99	−551.32	−62.55	127.03	1.25	2.35	−42.90	8.34
2009	−25.85	−42.67	24.43	596.91	−57.25	−83.41	5.46	0.51	−0.73	−62.60	−23.63
2010	122.01	155.20	106.89	11424.73	68.87	−46.03	36.84	−0.15	−1.10	59.02	245.19
2011	23.86	7.78	49.20	2420.76	632.39	−48.88	195.63	2.06	5.75	−22.47	26.05
2012	0.05	−5.30	31.29	979.10	−590.38	−73.49	75.48	0.27	0.77	−21.39	9.30
2013	16.63	9.91	42.12	1774.39	425.03	−73.23	42.88	1.05	2.17	−14.99	36.37
2014	31.81	38.52	47.39	2245.72	123.03	−47.20	177.93	0.88	1.55	8.05	71.93
Average	26.93	24.82	65.03	6150.53	56.84	−39.06	155.10	1.31	3.97	−13.87	45.93
Infrastructure											
2001	−16.67	−6.94	17.28	298.73	−248.99	−61.70	11.76	−2.10	3.63	−6.77	0.00
2002	21.94	5.48	16.04	257.37	292.70	−37.85	59.70	1.59	4.95	0.00	4.98
2003	−2.05	1.58	14.33	205.29	906.96	−38.42	43.63	0.29	3.76	0.00	2.50
2004	169.06	58.54	118.85	14124.45	203.02	0.00	482.75	2.41	5.20	0.00	85.42
2005	67.17	72.21	124.25	15437.33	172.07	0.00	467.47	1.81	2.60	0.00	136.12
2006	128.62	75.57	133.06	17704.79	176.08	0.00	747.58	3.11	12.86	0.00	115.69
2007	115.77	14.03	115.63	13371.03	824.16	−47.41	802.61	6.73	46.71	−0.84	2.98
2008	32.73	28.48	48.39	2341.89	169.91	−40.73	212.87	1.70	3.43	0.00	44.13
2009	−53.44	−51.92	29.25	855.36	−56.34	−87.03	0.00	0.71	−0.83	−76.52	−34.78
2010	115.17	146.51	117.47	13799.23	80.18	0.00	642.00	1.61	5.39	68.19	201.28

(continued)

Table 5.7 (continued)

Year	Weighted average annual returns	Mean returns	Standard deviation	Variance	Coefficient of variation	Minimum returns	Maximum returns	Skewness	Kurtosis	Lower quartile	Upper quartile
2011	−11.65	−15.86	31.77	1009.06	−200.32	−73.98	115.28	1.40	4.89	−37.99	0.23
2012	−0.48	−10.54	27.65	764.66	−262.33	−62.88	57.81	0.35	−0.40	−30.45	12.05
2013	3.43	−11.71	27.10	734.50	−231.43	−70.90	63.96	0.29	0.04	−32.15	6.71
2014	3.99	−2.77	39.78	1582.13	−1436.10	−47.52	188.47	2.88	11.75	−29.55	8.82
Average	40.97	21.62	61.49	5891.84	27.83	−40.60	278.28	1.63	7.43	−10.43	41.87
Power and electricals											
2001	14.24	−9.69	24.73	611.58	−255.21	−75.00	53.26	−0.32	0.80	−28.16	0.00
2002	6.13	19.76	47.37	2243.80	239.73	−62.86	161.93	1.75	2.98	0.00	22.14
2003	2.33	9.59	32.67	1067.47	340.67	−81.01	145.95	1.38	6.83	0.00	20.47
2004	139.27	107.43	117.26	13750.75	109.15	0.00	558.06	1.34	2.99	0.00	190.68
2005	14.76	46.85	69.63	4847.80	148.62	−29.71	326.50	2.01	4.94	0.00	73.04
2006	88.82	76.87	92.12	8486.01	119.84	−12.10	330.93	1.23	0.72	0.00	139.15
2007	31.42	9.93	37.00	1369.00	372.61	−45.36	157.07	1.83	4.87	−10.69	24.50
2008	57.30	33.59	49.72	2471.85	148.02	−46.49	153.61	0.77	−0.19	0.00	65.92
2009	−28.64	−37.41	23.97	574.48	−64.07	−84.93	1.01	0.23	−1.00	−56.65	−17.99
2010	69.18	134.58	111.61	12457.28	82.93	−5.03	525.56	1.04	1.64	49.20	221.26
2011	−7.07	−10.27	24.42	596.38	−237.78	−46.55	95.00	1.78	6.32	−25.95	0.83
2012	−18.77	−15.07	19.72	388.82	−130.86	−48.39	52.77	0.90	1.84	−28.91	−6.64
2013	−5.83	−16.70	21.98	482.99	−131.62	−75.80	49.50	0.21	1.20	−30.80	0.12
2014	22.83	28.47	39.93	1594.44	140.25	−45.47	125.94	0.57	−0.04	−5.03	54.22
Average	27.57	27.00	50.87	3638.76	63.02	−47.05	195.51	1.05	2.42	−9.79	56.26
Transport											
2001	−11.40	−0.93	86.60	7499.74	−9311.83	−65.00	530.09	5.50	33.74	−35.76	0.00

(continued)

Table 5.7 (continued)

Year	Weighted average annual returns	Mean returns	Standard deviation	Variance	Coefficient of variation	Minimum returns	Maximum returns	Skewness	Kurtosis	Lower quartile	Upper quartile
2002	85.77	26.98	45.85	2102.26	169.94	−28.57	176.17	1.55	2.04	0.00	54.03
2003	4.48	7.68	28.95	837.97	376.95	−55.19	78.71	0.39	0.49	0.00	22.77
2004	161.82	95.06	102.77	10562.35	108.11	0.00	370.76	0.86	−0.22	1.33	163.34
2005	14.49	36.95	55.45	3074.57	150.07	−23.53	206.33	1.43	1.46	0.00	68.97
2006	91.29	58.04	56.35	3175.60	97.09	−3.63	186.11	0.59	−0.71	1.12	101.26
2007	2.49	1.28	23.84	568.53	1862.50	−56.17	64.11	0.31	1.48	−9.66	11.51
2008	3.58	5.77	40.97	1678.40	710.05	−73.84	187.74	2.15	8.27	−11.21	15.24
2009	−16.64	−38.78	27.99	783.53	−72.18	−85.62	54.01	0.96	1.20	−61.08	−15.90
2010	160.41	169.47	115.48	13336.14	68.14	0.00	455.87	0.65	−0.15	81.24	239.16
2011	26.27	16.39	35.25	1242.78	215.07	−49.46	104.36	0.29	−0.54	−8.68	47.55
2012	11.29	9.10	40.57	1646.22	445.82	−50.65	160.91	1.52	3.77	−15.45	26.13
2013	4.65	−3.25	26.71	713.38	−821.85	−51.28	88.30	1.18	2.17	−20.86	9.76
2014	44.04	48.01	52.92	2800.46	110.23	−52.36	205.35	1.12	1.51	16.54	76.49
Average	41.61	30.84	52.84	3573.00	−420.85	−42.52	204.92	1.32	3.89	−4.46	58.59
Textiles and chemicals											
2001	−20.35	−20.33	30.69	941.91	−150.96	−85.93	80.88	0.62	2.10	−41.51	0.00
2002	22.60	21.34	34.74	1207.13	162.79	−52.05	128.60	0.88	1.79	−0.96	34.16
2003	16.61	13.63	29.62	877.52	217.31	−53.27	70.69	−0.11	−0.01	0.00	31.26
2004	118.07	114.53	108.03	11670.45	94.32	0.00	421.24	1.20	1.15	31.96	202.47
2005	58.25	65.01	64.08	4105.76	98.57	−18.40	223.51	1.04	0.36	14.76	88.59
2006	113.35	91.30	103.81	10777.36	113.70	−17.12	435.43	1.90	3.55	18.54	110.71
2007	4.67	−7.93	26.05	678.61	−328.50	−67.34	61.66	0.25	0.70	−24.32	5.39
2008	31.04	15.75	33.27	1106.63	211.24	−49.48	82.93	−0.08	−0.75	−9.17	44.03

(continued)

Table 5.7 (continued)

Year	Weighted average annual returns	Mean returns	Standard deviation	Variance	Coefficient of variation	Minimum returns	Maximum returns	Skewness	Kurtosis	Lower quartile	Upper quartile
2009	−30.56	−32.42	28.17	793.53	−86.89	−76.69	37.96	0.25	−0.33	−59.80	−11.57
2010	145.26	135.40	72.08	5195.05	53.23	0.00	337.98	0.56	0.31	81.82	190.39
2011	34.92	30.69	37.66	1418.49	122.71	−33.16	149.54	0.87	1.72	2.97	49.62
2012	16.22	5.05	25.09	629.49	496.83	−35.82	68.03	0.44	−0.31	−13.26	26.54
2013	26.40	3.14	34.14	1165.43	1087.26	−58.19	83.91	0.60	−0.23	−25.82	26.95
2014	18.69	24.32	41.14	1692.14	169.16	−38.65	160.79	1.40	2.18	−1.77	43.64
Average	39.66	32.82	47.76	3018.54	161.49	−41.86	167.37	0.70	0.87	−1.90	60.16
Miscellaneous											
2001	−75.71	−13.08	32.63	1064.46	−249.46	−89.22	48.22	−1.04	0.57	−18.02	0.15
2002	7.96	0.41	23.54	553.94	5741.46	−50.06	83.53	1.03	4.31	0.00	4.88
2003	−31.33	−7.46	20.57	423.24	−275.74	−61.65	32.66	−0.91	0.84	−19.45	0.00
2004	31.89	72.03	110.87	12291.54	153.92	0.00	458.19	2.02	3.87	0.00	95.43
2005	18.61	43.25	68.62	4709.34	158.66	−11.28	270.93	1.88	3.18	0.00	53.96
2006	94.04	45.78	52.85	2793.35	115.44	0.00	203.00	0.98	0.54	0.00	89.75
2007	8.93	14.15	63.77	4067.11	450.67	−38.00	251.00	3.07	9.48	−18.25	5.07
2008	28.47	11.57	49.92	2492.29	431.46	−48.39	185.60	2.29	6.20	−15.63	20.36
2009	−16.36	−31.18	26.99	728.22	−86.56	−69.67	20.50	0.32	−1.38	−53.33	0.00
2010	107.27	95.04	76.00	5776.00	79.97	0.00	244.02	0.21	−1.01	12.85	154.57
2011	20.97	10.67	29.97	898.12	280.88	−53.81	68.04	−0.09	−0.09	−5.10	29.55
2012	13.03	5.66	42.71	1824.55	754.59	−70.72	130.25	1.11	1.70	−21.62	26.67
2013	16.25	6.86	34.58	1195.63	504.08	−39.76	131.75	1.56	4.11	−11.00	17.96
2014	29.26	16.27	31.60	998.63	194.22	−35.28	86.43	0.72	−0.31	−7.91	33.18
Average	18.09	19.28	47.47	2844.03	589.54	−40.56	158.15	0.94	2.29	−11.25	37.97

The overall returns emanating from all of the segregates have been commendable. However, as has also been indicated in other chapters, high volatility (risk) is present in the returns at the segregated levels, as well.

Overall, the returns vary along with the various segregates, providing the investors diversification opportunities, based on the same. A negative correlation appears between the age of companies and returns. Further, small and medium-sized companies yield higher returns compared to their large counterparts. The findings are similar to the findings of Banz (1981), Wong and Lye (1990), Lau et al. (2002) and Manjunatha and Mallikarjunappa (2012). The apparent 'age' and 'size' anomalies are also indicative of the status of market efficiency. The aspect of market efficiency is explored further in Chap. 8.

Companies such as Aurobindo Pharma, Monsanto India, BF Utilities, Tata Elxsi, Reliance Communications and BEML appear attractive investment choices for equity investors. However, considering the substantial volatility present in all segregates, investors would do well to analyse each company both fundamentally and technically, for possible risk considerations, before investing.

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Chapter 6
Analysis of Price Multiples

Introduction

This chapter has been devoted to the analysis of the price multiples, viz. the price/earnings (*P/E*) ratio and the price/book value (*P*/*B*) ratio, for the sample companies, over the period of the study. This part of the research study attempts to build on the seminal work by Gupta et al. (1998) who reported the Indian *P*/*E* ratios, perhaps, for the first time. Reference to their work and relationship with their findings would find recurrence in this chapter.

Amongst the most practical ways of determining whether the prevailing share prices are rational is through *P*/*E* ratios. The *P*/*E* ratio signifies the price being paid by the buyer of equities for each rupee of annual earnings, whether distributed as dividends or retained in the company. The *P*/*E* ratio is also a useful indicator of the investors' (market's) mood and state. It measures the overall reasonableness or, otherwise, the market's valuation.

Theoretically, the *P*/*E* ratio is not a perfect measure. The reason is, whilst the price which an investor pays for a share is really for buying the future stream of earnings, the *P*/*E* ratios are actually computed from the past (latest available) earnings per share (EPS). Despite their imperfect nature, the practical usefulness of *P*/*E* ratios is widely recognized in the world of investments in stock markets. In fact, analysis of equity investment and returns is incomplete without taking note of the *P*/*E* ratio.

The computation of *P*/*E* and *P*/*B* ratios requires inputs of share price, EPS and book value/price (net worth) per share.

For better exposition, this chapter has been divided into five sections. Section I provides a brief literature review of studies related to price multiples. Section II is devoted to presenting broad groups of *P*/*E* ratios as per Gupta's work. This section also enumerates guidelines for better interpretation of such ratios. Section III contains the scope and methodology used behind calculating the *P*/*E* ratio, the *P*/*B*

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ratio and the EPS growth. Section IV presents the computed *P*/*E* ratios and its analysis taking into consideration the *P*/*B* ratio and the EPS growth for the sample. Section V contains the summary.

Section I: Literature Review

The literature review focuses on studies carried out/related to price-to-earnings ratio/multiple and price-to-book value ratio as well as the factors affecting them.

Sivy (1996) reviewed the companies identified by T.J. Peters and R.H. Waterman in their book, *In Search of Excellence*, in the early 1980s. The majority of the *excellent* companies identified by them underperformed the market during 1981–1985. In marked contrast, Sivy noted that the majority of the *non-excellent* companies beat the market, outperforming the Standard & Poor (S&P) index. This could be possible because the investors had bought the shares of *excellent* companies at *non-excellent* (too high) prices and the shares of *non-excellent* companies at *excellent* (low) prices. For the buyers, the buying prices determine the returns. Clearly, shares bought at low *P*/*E* ratio (in general) are likely to be more rewarding to the investors vis-à-vis shares bought at higher *P*/*E* multiple.

Chen and Zhang (2007) have explained how accounting variables are related with cross-sectional changes in stock returns. They noted returns as a function of earnings yield, equity capital investment, changes in profitability, growth opportunities and discount rates. Ferreira and Santa-Clara (2011) studied data from 1927 to 2007 and attempted to forecast the components of stock market return. The resultant significant components were dividend–price ratio, earnings growth and price–earnings growth. Frankel and Lee (1998) used an analyst-based residual income model and the resulting value-to-price (*V*/*P*) ratio to examine issues related to market efficiency and the predictability of cross-sectional stock returns. They proved that the value-to-price (*V*/*P*) ratio was a reliable predictor of cross-sectional returns, particularly over longer time horizons.

Wong and Lye (1990) attempted to provide evidence on the relation between stock returns and the effects of firm size and earnings-to-price ratio (*E*/*P*), with a sample from the stock exchange of Singapore. They observed that stock returns were significantly related to both size and *E*/*P*; between the two, the size effect appeared to be of secondary importance. Lau et al. (2002) examined the relationship between stock returns and beta, size, the earnings-to-price (*E*/*P*) ratio, the cash flow-to-price ratio, the book-to-market equity ratio and sales growth (SG) by studying the data of the Singapore and Malaysian stock markets for the period 1988–1996. They reported a negative size effect and a positive *E*/*P* effect on stock returns.

Morelli (2007) examined the role of beta, size and book-to-market equity as competing risk measurements in explaining the cross-sectional returns of UK securities for the period July 1980 through June 2000. Size was not observed to be a significant risk variable, whereas book-to-market equity was observed to be priced

by the market; in other words, it had been noted as a significant determinant of security returns. Manjunatha and Mallikarjunappa (2012) examined the validity of the five parameter model (the combination of five variables, viz. beta (β), size, *E*/*P*, book value/market value (BV/MV) and market risk premium (R_m–R_f) on Indian stock returns using cross-sectional regression. The results indicated that the combination of β, size, *E*/*P*, BV/MV and (R_m–R_f) variables explained the variation in security returns.

Section II: *P*/*E* Ratios in India

India began to open up its stock market gradually to foreign portfolio investment in the 1980s. This had the effect of raising the Indian *P*/*E* ratios to international levels. Further, the Indian government provided fiscal incentives to domestic savers for investing in equities. This pushed up the domestic demand for equities and led to the popularization of equity investment amongst the investing community (in particular the middle class). As a result of all these developments, India experienced a strong and long bullish market for a decade and a half from the early 1980s to the first half of the 1990s (Gupta et al. 1998). In their study, Gupta et al. classified the state of the Indian stock market into four broad categories based on the market's average *P*/*E* ratio:

1. Dangerously high average *P*/*E* ratio—a *P*/*E* ratio of greater than 21—was a symptom of a market bubble. This was a signal of exiting from the market instead of entering into it.
2. High average *P*/*E* ratio—a *P*/*E* ratio between 18 and 20. Caution was required to be exercised in entering into the market, if at all, in this situation.
3. Reasonable average *P*/*E* ratio—a *P*/*E* ratio between 13 and 17. The *P*/*E* ratio was neither too high nor too low, but was just around an economically justifiable or normal level.
4. Abnormally low market *P*/*E* ratio—a *P*/*E* ratio of less than 12. This offered a rare opportunity of buying stocks at advantageous prices, an opportunity which occurred once in many years.

The benchmarks suggested above did not apply to individual company *P*/*E* ratios but to the market's average *P*/*E* ratio only.

Over the past two decades, Indian investors have come to accept a substantially reduced dividend yield, i.e. dividend as per cent of market price; it is, to a marked extent, also a reflection of the rise in the *P*/*E* ratios, especially because the dividend payout ratio has remained largely unchanged (Jain et al. 2013). The average dividend yield for the actively traded shares in India declined from around 6.15 % at the beginning of 1980s to less than 2 % for most of the 1900s (Gupta et al. 1998).

As a logical corollary of the above capital gains constitute relatively more important component of equity returns (and dividends less important). Investors cannot, therefore, expect a regular annual return from equity investments in most

cases because capital gains (or losses) due to equity price appreciation (or depreciation) will always be uncertain in a volatile market like India (refer Chap. 4 on returns). In fact, it is a built-in aspect of equity investments.

In India, the use of the *P*/*E* ratio was not very common till as late as 1990.

Interpreting the P/E *Ratio: A Word of Caution*

A high *P*/*E* ratio is suggested when the investors are confident about the company's future performance/prospects and have high expectations of future returns; high *P*/*E* ratios reflect optimism. On the contrary, a low *P*/*E* ratio is suggested for shares of firms in which investors have low confidence as well as expectations of low returns in the future years; low *P*/*E* ratios reflect pessimism (Khan and Jain 2014).

Further, the future maintainable earnings/projected future earnings should also be used to determine EPS. It makes economic sense in that the investors have access to future earnings only. There is a financial and economic justification to compute forward or projected *P*/*E* ratios with reference to projected future earnings, apart from historic *P*/*E* ratios. This is especially true of present businesses that operate in a highly volatile business environment. Witness in this context is the following: 'In a dynamic business world, a firm's past earnings record may not be an appropriate guide to its future earnings. For example, past earnings may have been exceptional due to a period of rapid growth. This may not be sustainable in the future…' (Ramanujam 2000).

The *P*/*E* ratios should, however, be used with caution as the published *P*/*E* ratios are normally based on the published financial statements of corporate enterprises. Earnings are not adjusted for extraordinary items and, therefore, to that extent, may be distorted. Besides, all financial fundamentals are often ignored in the published data. Finally, they reflect market sentiments, moods and perceptions. Assuming retail stocks have been overvalued/undervalued, this error could, in all probability, be built into the valuation as well (Damodaran 1996).

In spite of these limitations attributed to the *P*/*E* ratio, it is the most widely used measure of valuation. The major reasons are as follows: (i) it is intuitively appealing in that it relates price to earnings; (ii) it is simple to compute and is conveniently available in terms of published data; (iii) it can be a proxy for a number of other characteristics of the firm, including risk and growth (Damodaran 1996).

Earnings Per Share (EPS)

According to corporate finance theory, the EPS is the ultimate source of shareholders' returns, whether by way of capital appreciation or dividends. In practice also, the use of EPS is common amongst market analysts for the purpose of assessing or estimating the future possibilities of returns from shares (Gupta et al. 1998).

The most important factor behind the growth of EPS is the ploughing back of profits by Indian companies. Every rupee of retained profit represents reinvestment on behalf of shareholders. In the case of sound investments, it should result in a higher profit (higher EPS) without increasing the number of shares. The rate of EPS growth will depend on how efficiently the management employs the retained profits.

The EPS growth, to a marked extent, would depend on the extent to which a company is able to take advantage of the following:

1. technological progress,
2. organizational improvements,
3. economies of scale and
4. profitable takeover/merger opportunities.

Relationship Between EPS and Prices

On a priori basis, there is expected to be positive relationship between EPS and share prices as well as dividends. Of the two companies, other things being equal (say, size, type of business, quality of management, etc.), the one having a higher EPS will normally command a relatively higher market price. Likewise, as a company's EPS grows, the market value of its shares may also exhibit appreciation (may not be in the same proportion).

P/B ***Ratio***

The price-to-book value/net worth (*P/B*) ratio is an indication of how the market values the company vis-à-vis its book value/net worth. Hence, a low *P/B* ratio indicates an undervalued company which translates into a good investment opportunity for the fundamental investor; a higher *P/B* ratio, *prima facie,* is reckoned as a signal of the undervaluation of the company (as well as of its shares). An analysis of the *P/B* ratio would enable us to have insight whether Indian companies have been undervalued/overvalued during the period of the study.

Section III: Scope, Data and Methodology

The research methodology adopted in the study to compute the *P/E* ratio, *P/B* ratio and the EPS growth has been delineated in this section.

Scope

The sample comprises of the NSE 500 companies. The NSE 500 index of India comprises of the top 500 companies listed on the NSE based on their market capitalization representing 96.76 % of the free-float market capitalization and 97.01 % of the traded value of all stocks on NSE (Source: National Stock Exchange (NSE) Website. http://www.nseindia.com/products/content/equities/indices/cnx_500.htm).

The sample is representative in nature as the NSE 500 companies represent all industry groups. The date of sample selection was 11 March 2013. The period of the study for this chapter is 2001–2014.

NSE 500 Index Background

The company Standard & Poor's (S&P) introduced its first stock-based index in 1923 in the United States of America (USA). The transition of the index from market-value weighted to float weighted was made recently, in two steps, the first on 18 March 2005 and the second on 16 September 2005 (Source: Wikipedia Website. http://en.wikipedia.org/wiki/S%26P_CNX_500).

Its Indian counterpart, the CNX 500 (hereby referred to as NSE 500), is India's first broad-based benchmark of the Indian capital market. CNX stands for the Credit Rating Information Services of India Limited (CRISIL) and the NSE. These two bodies own and manage the index through a joint venture called the India Index Services and Products Limited (IISL) (Investopedia 2013).

Secondary Data and Analysis

Definition of *P*/*E* Ratios

The numerator 'P' of the *P*/*E* ratio stands for the market price of a share and the denominator 'E' for earnings per share (EPS). The *P*/*E* ratio signifies the price being paid by the buyer of equities for each rupee of annual earnings, whether distributed as dividends or retained in the company. Its inverse (i.e. *E*/*P*, known as 'earnings yield') measures corporate profitability in relation to the market value of corporate equity. A company's *P*/*E* ratio, although not the only factor, is important for judging whether the prevailing market price of a share is reasonable, i.e. economically justifiable. A market's average *P*/*E* ratio (as distinct from the individual company's *P*/*E* ratio) is an important market indicator of the general state of the share market.

Computation of *P*/*E* Ratios

The yearly *P*/*E* ratio of an individual company has been computed by using the year's average share price and the latest reported annual EPS. The year's average share price of a company has been derived by averaging the year's high and low prices. Such averaging has been proved to have high reliability.

Computation of *P*/*B* Ratios

The yearly *P*/*B* ratio of an individual company has been computed by using the year's average share price, and the latest reported total assets less the intangible assets, fictitious assets and external liabilities.

$$\text{P/B ratio} = \text{Market Price/Book Value per Share}$$

Computation of EPS Growth

The EPS growth data for each year for a company was taken and then averaged, using their market capitalization as the weight, to arrive at the EPS growth for the sample.

Data Sources and Analysis

The relevant data (secondary) were collected from the Bloomberg® database, for fourteen years (2001–2014). Descriptive statistical values/positional values, i.e. mean, standard deviation, variance, coefficient of variation, minimum, maximum, skewness, kurtosis and quartile values, have been computed for each year. The period of the study has been divided into two phases, viz. prerecession (2001–2008) and post-recession (2009–2014), to analyse whether there has been any impact on the price multiples due to the recession which originated in the USA in 2008. The paired t-test has been administered to test the same. The entire set of data has been analysed using Microsoft Excel® spreadsheets and the statistics software SPSS®, namely Statistical Package for Social Sciences.

Section IV: Price Multiples

It is a well-established economic proposition that a high *P*/*E* multiple reflects optimism about the future earnings prospects of a corporate and a low *P*/*E* multiple of pessimism, suggesting low earnings in future years. Given this premise, Table 6.1 presents the interpretation of varying values of *P*/*E* ratios, in five broad groups (on the pattern of Gupta's work).

Table 6.1 Interpretation of *P*/*E* ratios

P/*E* ratio	Interpretation
N/A	A company with no earnings has an undefined *P*/*E* ratio. By convention, companies with losses (negative earnings) are usually treated as having an undefined *P*/*E* ratio, even though a negative *P*/*E* ratio can be mathematically determined
0–10	Either the stock is undervalued, or the company's earnings are perceived to be on decline. Alternatively, current earnings may be substantially above historic trends or the company may have profited from selling assets. An analysis into the growth in earnings per share (EPS) can indicate whether the stock is a **value** stock or not
11–17	For many companies, a *P*/*E* ratio in this range may be considered fair value
18–25	Either the stock is overvalued, or the company's earnings are expected to increase. The stock may also be a **growth** stock
25+	A company whose shares have a very high *P*/*E* may have very high expected future growth in earnings, or this year's earnings may be considered exceptionally low, or the stock may be the subject of a speculative bubble

Whilst the frequency distribution of the *P*/*E* ratio has been presented first (Table 6.2), the descriptive statistics have been presented in Table 6.3.

The Indian economy appears to be led by more than six-tenths of the sample companies, in terms of aggressive (high) *P*/*E* ratios of more than 10. These are the *growth* stocks amongst the sample companies. Nearly 15 % of the sample companies have a *P*/*E* ratio of less than 5 as in 2014. This number has, however, come down substantially from more than 50 % in 2001. Another revealing finding that emerges from Table 6.2 is the fact that the Indian stock market (represented by the sample companies) appears to be overvalued and could be in the state of a bubble, in 2014, with more than 40 % of the companies reporting *P*/*E* ratios of more than 20.

For computing the descriptive statistics of mean, standard deviation, coefficient of variation, skewness, kurtosis, median and quartile values, the approach followed treats *P*/*E* ratios of less than 5 and more than 25 as outliers. The valid number of companies within the specified ranges has been indicated in column 2 of the table. The paired t-test results have been provided after Table 6.3. Figure 6.1 shows the average *P*/*E* ratios for the sample.

Paired t-test

	Paired differences					*t*	df	Significance (2-tailed)
	Mean	Standard deviation	Standard error mean	95 % confidence interval of the difference				
				Lower	Upper			
Phase 1–Phase 2	1.43	1.09	0.45	−2.58	−0.29	−3.22	5	0.02

The *P*/*E* ratio hovers around 13 for the sample companies, indicating reasonable to high (aggressive) ratios. The coefficient of variation is moderate (40 % plus) and

Table 6.2 Frequency distribution related to *P/E* ratio of sample companies, 2001–2014

P/E ratio	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
0–5	54.00	53.00	60.00	41.00	30.00	23.00	23.00	19.00	40.00	13.00	11.00	13.00	15.00	14.75
5–10	20.26	19.76	19.78	24.26	18.93	9.82	16.24	19.11	24.81	18.50	19.96	21.43	21.00	17.43
10–20	15.32	15.00	14.16	20.68	29.84	23.31	27.59	27.41	20.77	31.98	33.97	30.89	31.08	27.01
Above 20	9.35	11.71	5.84	13.50	20.37	43.15	32.49	34.36	14.23	36.03	34.93	34.36	32.05	40.23
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Total (100) may not tally due to rounding off

Table 6.3 Mean, standard deviation, coefficient of variation, skewness, kurtosis, median and quartile values related to *P*/*E* ratio of sample companies 2001–2014

Year ending[a]	Number of companies with *P*/*E* ratio <25 and >5	Mean	Standard deviation	Coefficient of variation (%)	Skewness	Kurtosis	Median	Quartile 1	Quartile 3
2001	146	10.67	4.71	44.14	0.93	0.10	9.25	6.86	13.16
2002	156	11.20	5.09	45.45	0.81	−0.41	9.81	6.85	14.39
2003	164	10.79	4.96	45.97	0.93	−0.03	9.37	6.70	13.76
2004	243	11.84	5.36	45.27	0.71	−0.49	10.42	7.53	15.46
2005	271	13.01	5.01	38.51	0.38	−0.82	12.75	8.79	16.20
2006	218	14.92	5.45	36.53	0.07	−1.22	14.34	10.28	19.99
2007	280	13.97	5.83	41.73	0.28	−1.11	13.41	9.00	18.52
2008	281	13.05	5.50	42.15	0.46	−0.89	12.10	8.30	17.60
2009	276	12.20	5.68	46.56	0.72	−0.65	10.63	7.50	15.91
2010	315	13.62	5.47	40.16	0.26	−1.00	13.04	8.82	17.60
2011	328	13.51	5.29	39.16	0.31	−0.91	13.06	8.88	17.44
2012	328	13.43	5.63	41.92	0.42	−0.96	12.53	8.82	17.73
2013	321	13.35	5.55	41.57	0.38	−0.95	12.63	8.73	17.81
2014	318	14.91	5.97	40.04	0.04	−1.28	15.24	9.51	20.62
2001–2014	260	12.89	5.39	42.08	0.48	−0.76	12.04	8.33	16.87
Phase 1 (2000–2001 to 2007–2008)	220	12.43	5.24	42.47	0.57	−0.61	11.43	8.04	16.14
Phase 2 (2008–2009 to 2013–2014)	314	13.50	5.50	41.57	0.36	−0.96	12.86	8.71	17.85

Figures are in percentages

(i) [a]The Indian financial year begins on April 1 and ends on March 31 of the following year. The same holds true for all subsequent tables and notations

(ii) Values of more than 25 and less than 5 are excluded

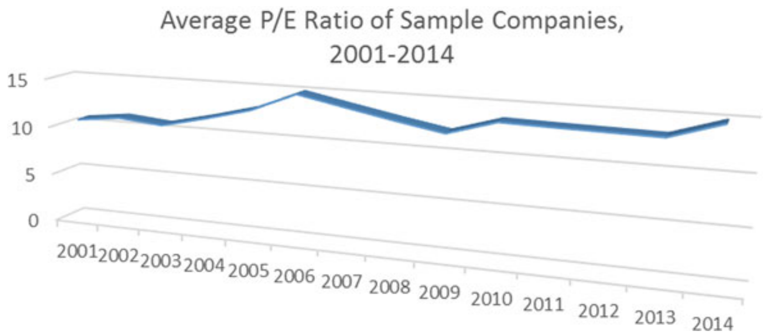


Fig. 6.1 Mean values of *P*/*E* ratio for sample companies, 2001–2014

has displayed little deviation (the range being 36.53–45.97 %) over the period of the study. The skewness and kurtosis values also indicate a near-normal distribution of the *P*/*E* ratios, indicating that the values are spread equally in both directions from the mean value. The quartile values have been stable as well throughout the period of the study. However, in 2014, the quartile 3 is 20.62 indicating a possible bubble in the stock market (Table 6.2). Further, there is a statistically significant change in the *P*/*E* ratios pre- and post-recession, as per the paired t-test, probably due to the lower *P*/*E* ratios in the first three years (2001–2003). The lower quartile figure of 8.33, as well as the upper quartile figure of 16.87, reflects the presence of both value stocks and growth stocks in the sample (Table 6.1).

On a priori basis, increase in EPS should yield to higher *P*/*E* multiple or vice versa. What has been the experience of the shares of the sample companies in this regard constitutes the subject matter of the remaining part of this section. Empirical analysis shows that the market price usually responds to the growth in EPS at the company level. The same is presented through Table 6.4. The paired t-test has also been administered to ascertain whether there was any statistically significant difference between the EPS growth between the two phases.

Paired t-test								
	Paired differences					*t*	df	Significance (2-tailed)
	Mean	Standard deviation	Standard error mean	95 % confidence interval of the difference				
				Lower	Upper			
Phase 1–Phase 2	83.44	83.29	34.00	−3.98	170.85	2.45	5	0.58

In spite of the substantial drop in EPS (−144.58 %) in 2009, due to the impact of the recession originating out of the financial crisis, the EPS has grown at an impressive rate of 27.01 % over the period of the study for the sample companies, indicating the robust and growing earnings capability of Indian companies

Table 6.4 Growth in EPS vis-à-vis *P/E* multiples for sample companies, 2001–2014

Year ending*	Growth in EPS (%)	*P/E* multiple
2001	22.04	10.67
2002	−8.06	11.20
2003	50.69	10.79
2004	55.41	11.84
2005	63.46	13.01
2006	176.39	14.92
2007	73.3	13.97
2008	85.55	13.05
2009	−144.58	12.20
2010	41.68	13.62
2011	3.99	13.51
2012	−29.45	13.43
2013	−12.41	13.35
2014	0.08	14.91
2001–2014	27.01	12.89
Phase 1 (2000–2001 to 2007–2008)	64.85	12.43
Phase 2 (2008–2009 to 2013–2014)	−23.45	13.50

(Table 6.4). Further, the paired t-test results also indicate that the change in the EPS over the two phases has not been statistically significant. The *P/E* ratio increased (albeit gradually, from 12.43 to 13.50) in spite of the fluctuating EPS growth (ranging from –144.58 to 176.39), through the period of the study. Hence, empirical evidence indicates that in cases where the portfolio was acquired at relatively low *P/E* ratios, the returns were commendable (refer Chap. 4 on returns). The opportunity for this was provided by a prolonged rise in P/E ratios so that the earlier period purchases benefitted immensely.

In continuation of the analysis of price multiples, whilst the *P/E* ratios indicate growth stocks, it is the *P/B* ratios that provide a further insight into value stocks. For the purpose, the *P/B* ratios for the sample companies were computed, for the period of the study. Frequency distribution of the *P/B* ratios for the sample is presented in Table 6.5. For computing the descriptive statistics of mean, standard deviation, coefficient of variation, skewness, kurtosis, median and quartile values, the approach followed treats *P/B* ratios of less than 0 and more than 5 as outliers. The valid number of companies within the specified ranges has been indicated in column 2 of Table 6.6. The paired t-test results have been provided after Table 6.6. Figure 6.2 shows the average *P/B* ratios for the sample companies.

The impact of the recession is clearly brought forth in 2009, with more than one-fifth of the sample companies reporting *P/B* ratios of less than 0.5. Nearly 30 % of the sample companies are undervalued in 2014 (Table 6.5). This figure has come down drastically from more than 70 % of undervalued companies in the beginning of the study period, 2001. This gradual decline in the undervalued companies,

Table 6.5 Frequency distribution related to *P*/*B* ratio of sample companies, 2001–2014

P/*B* ratio	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
0–0.5	37.00	36.00	40.00	26.00	21.00	19.00	15.00	10.00	22.00	7.00	4.00	6.00	8.00	9.20
0.5–0.8	12.00	13.00	12.00	7.00	3.00	2.00	3.00	3.00	17.00	3.00	6.00	12.00	18.00	12.80
0.8–1.0	4.00	5.00	7.00	5.00	3.00	1.00	4.00	4.00	6.00	5.00	6.00	9.00	5.00	6.80
1.0–2.0	11.00	16.00	16.00	22.00	22.00	16.00	22.00	25.00	26.00	26.00	33.00	27.00	26.00	25.20
2.0–3.0	5.00	4.00	4.00	11.00	15.00	12.00	12.00	15.00	12.00	21.00	18.00	16.00	14.00	13.00
3.0–5.0	3.00	3.00	6.00	10.00	16.00	19.00	18.00	20.00	9.00	19.00	17.00	16.00	14.00	14.00
Above 5	27.00	21.80	13.80	15.80	18.20	30.20	25.20	20.00	6.60	17.40	15.00	12.00	13.00	18.00
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Total (100) may not tally due to rounding off

Table 6.6 Mean, standard deviation, coefficient of variation, skewness, kurtosis, median and quartile values related to *P*/*B* ratio of sample companies 2001–2014

Year ending[a]	Number of companies with *P*/*B* ratio of >0 and <5	Mean	Standard deviation	Coefficient of variation (%)	Skewness	Kurtosis	Median	Quartile 1	Quartile 3
2001	359	0.80	0.95	118.75	2.14	5.02	0.48	0.23	1.03
2002	384	0.83	0.92	110.84	1.82	3.66	0.53	0.20	1.20
2003	423	0.88	1.02	115.91	1.75	2.80	0.54	0.14	1.18
2004	410	1.29	1.22	94.57	0.86	−0.05	1.07	0.00	2.03
2005	400	1.74	1.45	83.33	0.44	−0.78	1.62	0.00	2.78
2006	343	1.90	1.57	82.63	0.32	−1.07	1.72	0.00	3.18
2007	370	1.85	1.42	76.76	0.38	−0.85	1.61	0.86	2.95
2008	397	1.99	1.34	67.34	0.38	−0.69	1.82	1.08	3.00
2009	465	1.31	1.09	83.21	1.12	0.73	1.03	0.51	1.86
2010	410	2.08	1.22	58.65	0.25	−0.68	1.97	1.14	2.93
2011	421	2.00	1.18	59.00	0.66	−0.22	1.79	1.11	2.70
2012	435	1.83	1.19	65.03	0.79	−0.23	1.55	0.87	2.54
2013	435	1.71	1.20	70.18	0.90	−0.06	1.38	0.71	2.41
2014	408	1.75	1.21	69.14	0.90	−0.11	1.41	0.77	2.54
2001–2014	404	1.57	1.21	82.52	0.91	0.53	1.32	0.54	2.31
Phase 1 (2000–2001 to 2007–2008)	386	1.41	1.24	93.77	1.01	1.01	1.17	0.31	2.17
Phase 2 (2008–2009 to 2013–2014)	429	1.78	1.18	67.53	0.77	−0.10	1.52	0.85	2.50

Figures are in percentages

(i) [a]The Indian financial year begins on April 1 and ends on March 31 of the following year. The same holds true for all subsequent tables and notations

(ii) Values of more than 5 and less than 0 are excluded

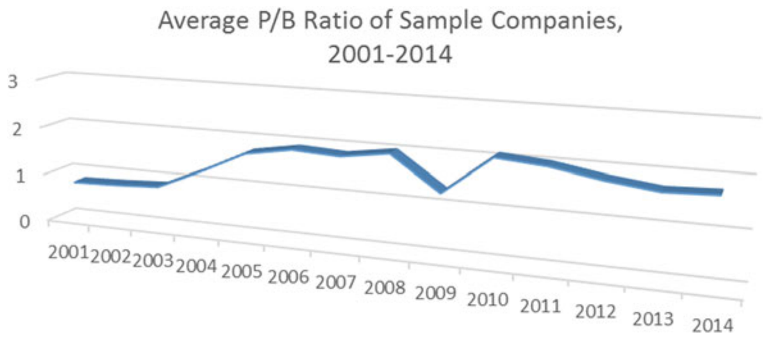


Fig. 6.2 Mean values of *P*/*B* ratio for sample companies, 2001–2014

representing value stocks, is an indication of the market responding to the investment opportunities presented. It is useful to bear in mind that not all undervalued companies have good growth potential; sometimes, there could be something drastically wrong with the company, preventing the market not to value it close to its asset base. According to Table 6.6, the average *P*/*B* ratio has been rising gradually from under 1 in 2001. However, the average of 1.57 still appears to be on the lower side. The measures of dispersion (standard deviation, coefficient of variation, skewness and kurtosis) exhibit a lot of variation, an indication of the volatility in the market. Lower quartile (quartile 1) values have been as low as 0, whilst the upper quartile value (quartile 3) has recorded a maximum of 3.18 during the period of the study, an indication towards lower *P*/*B* ratios, overall.

In prerecession years of 2005–2008, one-third of the sample companies were having *P*/*B* ratio of about 3, reflecting that the market price per share (MPS) is three times the book value (BV)/net worth of their shares; there has been a considerable decline in the *P*/*B* ratio in subsequent years. For instance, except in 2010, when the *P*/*B* ratio was 2.93, in the other years, the value ranged from 1.86 to 2.70. Hence, the Indian stock market presents positive investment potential in such companies where the *P*/*B* ratio is on the lower side, provided of course, they are fundamentally strong. Changes in the pre- and post-recession *P*/*B* values are not statistically significant.

Paired t-test								
	Paired differences					*t*	df	Significance (2-tailed)
	Mean	Standard deviation	Standard error mean	95 % confidence interval of the difference				
				Lower	Upper			
Phase 1–Phase 2	−0.54	0.57	0.23	−1.14	0.06	−2.31	5	0.07

Section V: Summary

The Indian economy appears to be led by more than six-tenths of the sample companies, in terms of aggressive (high) *P*/*E* ratios of more than 10. These are the *growth* stocks amongst the sample companies. Nearly 15 % of the sample companies have a *P*/*E* ratio of less than 5 as in 2014. This number has, however, come down substantially from more than 50 % in 2001. Further, the market response to EPS growth is evident. This can be regarded as a testimony of fundamentals applying in the Indian economy. Fundamental investors are doing and are likely to do well to identify the companies which are better than average performers in terms of EPS growth over long periods and map them against their *P*/*E* ratios. The equity research should particularly focus on EPS growth of companies, both at individual company level and portfolio level.

Another revealing finding of the analysis is the fact that the Indian stock market (represented by the sample companies) appears to be overvalued and could be in the state of a bubble, in 2014, with more than 40 % of the companies reporting *P*/*E* ratios of more than 20.

However, the aspect that the sample companies also represent *value* stocks is brought forth by the *P*/*B* ratios. Lower *P*/*B* ratios through the period of the study are indicative of undervalued companies.

In sum, when seen along with the findings of Chap. 4 on returns, it appears that the Indian stock market provides returns to both fundamental (long-term) and technical (short-term) investors. It is an indication of the breadth of the Indian stock market, in terms of presenting opportunities of investment to both kinds of investors. This is perhaps why the Indian stock market continues to attract domestic as well as foreign capital market investments.

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Chapter 7
Volatility in Stock Returns

Introduction

Although volatility in returns on equity stocks/shares is inherent, the presence of excessive volatility may not be preferred by a large number of equity investors (in particular, genuine long-term investors). Given the fact that there is an increasing number of investors willing to cross borders to diversify their portfolios, it becomes important for them to know the level/magnitude of volatility present/associated with Indian equity markets. For these reasons, it is useful to undertake a study that examines the volatility in stock returns in India. This constitutes the rationale of the present chapter.

For better exposition, this chapter has been divided into four sections. Section I provides the literature review of studies focusing on behaviour of returns. Section II contains the scope and methodology used to study volatility/behaviour of returns. Section III presents the specific characteristics exhibited by the returns along with the statistics deployed to determine the same. Section IV contains the summary. Annexure 7.1 contains a glossary of technical terms used in the chapter, with their meaning.

Section I: Literature Review

Earlier stock market theories centred on the random walk behaviour of stock prices asserting that neither prices have any predictable time pattern, nor they offer any insight for speculating on future movements (Kendall 1953; Fama 1965; Granger and Morgenstern 1963; Sharma and Kennedy 1977). Eventually, evidences against the random behaviour of stock prices began to gain ground. Since the application of statistical techniques by Mandelbrot (1963) and Fama (1965) on stock returns,

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researchers have documented the presence of patterns in the time series of prices, returns and volatilities.

International Studies on Behaviour of Returns

Roberts (1959) analysed American data for indices as well as individual companies, taking data points at both small and large intervals; he reported that both the index price levels and changes in the individual company's price levels behaved as if they were derived from a chance model. Gordon (1959) explained the variation in the price of the stock by developing a model; the model aimed at identifying the parameters that investors considered and the weights they assigned to these parameters in buying common stocks. Praetz (1972) presented both theoretical and empirical evidence about a probability distribution which described the behaviour of share price changes.

Lynch and Mendenhall (1997) analysed price and volume data for firms added to and deleted from the Standard & Poor's (S&P) 500 index since 1989 for a distinct pattern of stock price movements. The price reversal after addition and deletion strongly suggested the existence of temporary price effects, caused by index-fund trading associated with S&P 500 composition changes. Frankel and Lee (1998) deployed an 'analyst-based residual income' model to examine issues related to the predictability of cross-sectional stock returns. The index returns were found to be leptokurtic. Saatcioglu and Starks (1998) examined the stock price–volume relation. Using monthly index data, they documented a positive relation between volume and the magnitude of price change as well as the price change itself.

Handa et al. (1989) examined the behaviour of beta as a function of the return measurement interval. It was observed that betas of high-risk securities increased with the return interval, whereas betas of low-risk securities decreased with the return interval. Francis et al. (2000) compared the reliability of the value estimates from the three models—the discounted dividend model, the discounted free cash model and the discounted abnormal earnings model. It was observed that the discounted abnormal earnings (AE) model was more accurate and reliable than the other two models.

Parisi and Vasquez (2000) studied the stock market returns of Chile from 1987 to 1998. Xinga and Howe (2003) applied the general autoregressive conditional heteroscedasticity—mean (GARCH-M) model to the weekly stock index returns from the United Kingdom (UK); they documented a significant positive relationship between stock returns and the variance of returns. The study by Trueman et al. (2003) analysed the pricing of Internet firms around their earnings announcements. The stock prices of Internet firms rose during the 5 days prior to the earnings announcement and fell in the 5 days following the announcement. Berger (2003) extended this study and focused on the major concerns raised by the price pressure explanation offered.

Goyal and Welch (2003) observed that the primary source of poor predictive ability is parameter instability. Belter et al. (2005) presented a new dividend-adjusted blue chip index for the Danish stock market covering the period 1985–2002. Jeyanthi (2010) studied the stock markets of the emerging economies (India, China, Indonesia, Kuala Lumpur, Korea and Taiwan) from 1998 to 2009 to test for the weak form of market efficiency. Mixed results were observed using different tools. Coutts (2010) revisited the work of Coutts and Cheung (2000) to test the predictive capabilities of the technical trading rules in the Hong Kong stock market. It was concluded that the strategies that could yield profitable results at one point of time could not always be relied upon (as their potentials to outperform market returns were not the same at all points of time).

Liu et al. (2010) studied the sources of multifractality over time for the Shenzhen stock market. Chordia et al. (2011) explored the sharp uptrend in the trading activity and the accompanying changes in market efficiency, using sample data consisting of the New York Stock Exchange (NYSE) listed equity stocks for the sample period 1993–2008. Alagidede (2011) examined the stock-return predictability in Africa's emerging equity markets. Majumder (2011) devised a model which incorporated the market sentiments for the 'less than' efficient market. He contended that the equity price was an outcome of the combined effect of news/information released in the market and subsequent sentiments cultivated by them.

Maher and Parikh (2011) examined the short-term price behaviour of three market parameters (market capitalization, crisis versus non-crisis periods and magnitude of shocks) in response to informational shocks. They concluded that the market, in general, reacted more towards positive events. Majumder (2012) analysed the Brazil, Russia, India and China (BRIC) equity markets and compared them with markets in the USA. The findings suggested that it would be difficult to segregate an 'efficient' set of markets from their 'inefficient' counterparts. Johnson and So (2012) examined the information content of option and equity volumes when the agents were privately informed and the trade direction was unobserved. Golez (2012) showed that the S&P 500 futures were pulled towards 'at-the-money strike price' on days when the serial options on the S&P 500 futures expired and were pushed away from the 'cost-of-carry adjusted at-the-money strike' price right before the expiration of options on the S&P 500 index.

Savor (2012) studied how information presence affected the post-event performance of stocks experiencing large price changes, using regression analysis. The results indicated that investors under-reacted to news about fundamentals and over-reacted to other 'shocks' that moved stock prices down. Lai et al. (2012) examined the day-of-the-week effect on the Shenzhen stock market. They concluded that there was a significant Thursday effect. Wahal and Yavuz (2013) analysed the role of 'style investing' on asset-level return predictability. 'Style investing' refers to an investment approach in which rotation amongst different 'styles' is supposed to be important for successful investing, for example, placing money in broad category of assets, such as 'growth' or 'emerging markets'. They based their analysis on the prediction framework provided by Barberis and Shleifer (2003);

the framework emphasized that under certain conditions, 'style investing' could generate predictability in returns.

Indian Studies on Behaviour of Returns

Studies focusing on the behaviour of returns in India have started only in recent years.

Dicle et al. (2010) evaluated the Indian equity market for its efficiency and its potential to offer diversification benefits to international investors. The Indian equity market was found to be integrated with the international equity markets, a characteristic that lowered international diversification benefits. Mishra et al. (2011) focused on the issue of nonlinearities in stock price data. They concluded that the Indian stock market exhibited 'random walk'. Gahlot and Datta (2011) studied the impact of futures trading on the weak form of efficiency and volatility of the Indian equity market. They used the exponential general autoregressive conditional heteroscedasticity (EGARCH) model to capture the asymmetric nature of the volatility. The findings suggested that future trading did not have any significant effect on equity market volatility.

It is evident from the literature reviewed that a comprehensive study on the behaviour/pattern of Indian equity returns, for such a large sample and period, has perhaps not been undertaken, so far. This chapter is an attempt to fill this gap.

Section II: Scope, Data and Methodology

The research methodology adopted to study the characteristics/behaviour of returns has been delineated hereunder.

Scope

The sample comprises the NSE 500 companies. The NSE 500 index of India comprises the top 500 companies listed on the NSE based on their market capitalization (Source: National Stock Exchange (NSE) Website. http://www.nseindia.com/products/content/equities/indices/cnx_500.htm).

The sample is representative in nature as the NSE 500 companies represent all industry groups. The date of sample selection was 11 March 2013. The period of the study is 1999–2014. This universe was chosen on the assumption that it would be an accurate representation of the equity returns in India.

NSE 500 Index Background

The company Standard & Poor's (S&P) introduced its first stock-based index in 1923 in the USA. The index had traditionally been market-value weighted. However, the index is now float weighted. That is, S&P now calculates the market capitalizations relevant to the index using only the number of shares (called 'float') available for public trading (Source: Wikipedia Website. http://en.wikipedia.org/wiki/S%26P_CNX_500).

Its Indian counterpart, the CNX 500 (hereby referred to as NSE 500), is India's first broad-based benchmark of the Indian capital market. CNX stands for the Credit Rating Information Services of India Limited (CRISIL) and the NSE; these are the two bodies which own and manage the index through a joint venture called the India Index Services and Products Limited (IISL). Without the additional abbreviation to S&P CNX, the index name would be S&P CRISIL NSE index (Investopedia Website, 2014).

The NSE 500 companies are disaggregated into 72 industry indices, viz., CNX industry indices (as on the date of sample selection). Industry weightages in the index reflect the industry weightages in the market. For example, if the consumer goods sector has a 5 % weightage in the universe of stocks traded on the NSE, the consumer goods stocks in the index would also have a representation of 5 % in the index (Source: National Stock Exchange (NSE) Website. http://www.nseindia.com/products/content/equities/indices/cnx_500.htm).

Secondary Data and Analysis

Daily closing price data of the NSE 500 index have been used to understand volatility/behaviour of returns and were collected from the Bloomberg® database. The other secondary data sources used to substantiate any missing data were the NSE's Website, Capitaline® and AceEquity® databases. The study period is from 1999 to 2014 and consists of 3749 daily observations.

Stock returns, defined as continuously compounded log returns, were computed as log of closing price of the NSE 500 on day t over closing price on day $t-1$ (the index value on the previous day the NSE was open). The return for each day was calculated with reference to the last working day. Weekends and public holidays were excluded from the sample of observations.

The returns were then subjected to various statistical tools and techniques which are detailed in the following section. The software EViews 8®, a dedicated financial statistics software, was used to run the tests for the variants of the GARCH family (both symmetric and asymmetric models) for different lag lengths.

Methodology

This section describes the rationale for the deployment of particular statistical tools in the analysis for the purpose of this paper. It starts from the basic return equation and then moves on to more complex equations to mirror the related complexity inherent in the financial returns series, viz., auto-regression, nonlinearity, volatility. Volatility has several financial applications, one being the improvement in the efficiency in parameter estimation and the accuracy in interval forecast. Volatility is not directly observable, but its behaviour can be seen in asset returns. Volatility exists in clusters and evolves over time in a continuous manner.

The return equation in a financial series is typically estimated as follows:

$$R_t = \gamma_0 + \sum_{i=1}^{i=p} \gamma_i R_{t-i} + u_t \tag{7.1}$$

where R_t is referred to as the return in time t which is a summation of the returns over the time series i to t and '$i = p$' indicates the order (degree) of auto-regression evident in prices; u_t is referred to as the Gaussian innovation with zero mean and a time varying variance h_t. The autoregressive order of p is chosen based on the Akaike information criteria (AIC) or the Schwarz information criteria (SIC). This model is typically a linear equation assuming zero or very little volatility. However, as has been stated earlier, the returns series typically exhibit nonlinearity or volatility.

Engle (1982) proposed the first ever model to provide a systematic framework for volatility modelling. It is commonly known as ARCH (autoregressive conditional heteroscedasticity) model. Put simply, heteroscedasticity refers to the circumstance in which the volatility (variability) of a variable is unequal across the range of values of a second variable that predicts it. ARCH Eq. (7.2) is provided as follows:

$$h_t = \theta_o + \sum_{i=1}^{i=m} \theta_i u_{t-i}^2 + e_t \tag{7.2}$$

The ARCH model is based on the assumption that the shock h_t of an asset return is serially uncorrelated, but dependent and hence this dependence can be represented using a simple quadratic function of its lagged values. These parameters are estimated by maximizing the maximum likelihood function. The order 'm' can be determined by AIC or SIC.

Though this is a simple approach, it suffers from some weaknesses. It does not distinguish between the effect of positive and negative shocks. The model is restrictive and limits the ability of ARCH models with Gaussian innovations to capture excess kurtosis. It usually overpredicts as it responds slowly to large isolated shocks to the return series. To overcome some shortcomings of ARCH model,

Engle and Bollerslev (1986) proposed the GARCH model. GARCH (*m*, *s*) model can be written as follows:

$$h_t = \theta_o + \sum_{i=1}^{i=s} \theta_{1i} u_{t-i}^2 + \sum_{j=1}^{j=m} \theta_{2j} h_{t-j} + e_t \tag{7.3}$$

Equation (7.3) is estimated using quasi-maximum likelihood estimation (QMLE) similar to Eq. (7.2). There are two restrictions imposed on Eq. (7.3). Whereas higher values of ARCH coefficients indicated conditional volatility showing large reaction and low persistence, the value of GARCH coefficients indicates the persistence of volatility. AIC or SIC can be used to determine the order of *m* and *s*.

The integrated generalized autoregressive conditional heteroscedasticity (IGARCH) is a restricted version of the GARCH model, where the persistent parameters sum up to one, and therefore, there is a unit root in the GARCH process. A variant of the same is the IGARCH-M (IGARCH-Mean); it assumes infinite variance. Both the GARCH and the IGARCH models belong to the family of symmetric GARCH models.

Campbell and Hentschel (1992) and Engle and Ng (1993) observed that volatility reacted differently to positive and negative shocks referred to as the 'leverage effect'. Symmetric GARCH-type models discussed in Eq. (7.3) cannot capture this effect. Hence, to overcome this weakness of GARCH-type models, Nelson (1991) proposed the asymmetric GARCH model called the exponential GARCH (EGARCH) model. EGARCH (*m*, *s*) process can be specified as follows:

$$\log(h_t) = \theta_o + \sum_{i=1}^{i=m} \theta_{1i} \log(h_{t-i}) + \sum_{j=1}^{j=s} \left(\theta_{2j} \left| \frac{u_{t-j}}{\sqrt{h_{t-j}}} - \sqrt{\frac{2}{\pi}} \right| + \gamma_j \frac{u_{t-j}}{\sqrt{h_{t-j}}} \right) \tag{7.4}$$

In simple words, the left-hand side term of Eq. (7.4) is the natural logarithm of the conditional variance. This ensures that even if the parameters are negative, the estimated variance will always be positive. The 'leverage effect' is captured by γ. The impact is asymmetric if $\gamma \neq 0$. If $\gamma < 0$, good news generates less volatility than bad news.

Glosten et al. (1993) and Zakoian (1994) developed an alternative asymmetric model to handle 'leverage effect' known as the threshold ARCH (TARCH) model. A general TARCH (*m*, *s*) model can be described as per Eq. (7.5):

$$h_t = \theta_o + \sum_{i=1}^{i=s} (\theta_{1i} + \gamma_i N_{t-i}) u_{t-i}^2 + \sum_{j=1}^{j=m} \theta_{2j} h_{t-j} \tag{7.5}$$

where, $N_{t-i} = 1$ if $u_{t-i} < 0$ and 0 otherwise.

A more generalized model was introduced by Ding et al. in 1993. It is known as asymmetric power ARCH (APARCH) model. It is more widely used as it includes the Taylor effect. The Taylor effect (by now well-established aspect in financial

literature) states that high-frequency time series of financial returns are often uncorrelated but not independent as there are nonlinear transformations which are positively correlated (Taylor 1993). APARCH is represented as follows:

$$h_t^\delta = \theta_o + \sum_{i=1}^{i=m} \theta_{1i} h_{t-i}^\delta + \sum_{j=1}^{j=s} \theta_{2j} (|u_{t-j}| + \gamma_j u_{t-j})^\delta \tag{7.6}$$

The return of a security may also depend on its volatility. To model this scenario, Engle et al. (1987) suggested the ARCH-M model, where 'M' stands for 'in the mean'. The variance equation remains the same for all the above-discussed models; however in ARCH-M, a volatility term is introduced in the mean equation. The APARCH model also yields the long-memory property of returns. The mean equation is given as follows:

$$R_t = \gamma_o + \sum_{i=1}^{i=p} \gamma_i R_{t-i} + \lambda h_{t-1} + u_t \tag{7.7}$$

In Eq. (7.7), λ represents the risk. If λ is positive, the investors are risk averse and are compensated for assuming higher risk. Glosten et al. (1993) presented that positive and negative relationships between price and volatility are consistent with theory. The IGARCH-M, EGARCH, TARCH and APARCH models belong to the family of asymmetric GARCH models.

Formulation of Hypotheses

The overall null hypothesis (H_0) could be stated as:

H_0 = Changes in index returns have been constant over the period of the study.

For the purpose of analysis of returns and based on the literature reviewed, the alternative hypotheses (H_n) constructed around the objectives (ii), (iii) and (iv) are:

(i) H_1 = There is evidence of volatility in the index returns over the time period of the study;
(ii) H_2 = There is evidence of 'volatility clustering' in the index returns over the time period of the study;
(iii) H_3 = There is evidence of 'leverage effect' in the index returns over the time period of the study;
(iv) H_4 = There is evidence of 'stationarity' in the index returns over the time period of the study.

Section III: Index Returns and Their Statistical Treatment

The objectives of this section are twofold. First, it sets out to present the descriptive statistics of the NSE 500 index returns. Secondly, it aimed at exhibiting the patterns (if any) and/or trends evident in the return series.

Table 7.1 provides a summary of the descriptive statistics of the NSE 500 index returns. Positive mean return is an indication of the fact that the returns have been positive over the time period studied. The high value of the range is indicative of a substantial difference between the minimum and maximum values of the data. The given time series distribution is marked by negative skewness and leptokurtosis, manifesting wide variations in the return values. Further, the significant value of the JarqueBera statistics (at 1 % level of significance) provides clear evidence to reject the null hypothesis of a Gaussian standard normal distribution of daily returns on the NSE 500 index. In operational terms, it implies that there is volatility in the returns. Further, the existence of conditional heteroscedasticity is also supported by the estimates of skewness and kurtosis. Figure 7.1 portraying the histogram of daily

Table 7.1 Mean, standard deviation, variance, kurtosis, skewness and range in daily returns of the NSE 500, 1999–2014

Descriptive statistic	Statistic value
Mean (log)	0.000511249
Standard deviation	0.01515395
Variance	0.000229642
Kurtosis	9.937031049
Skewness	−0.819859183
Range	0.278867383
Minimum	−0.14281113
Maximum	0.136056253
JarqueBera	14695.24

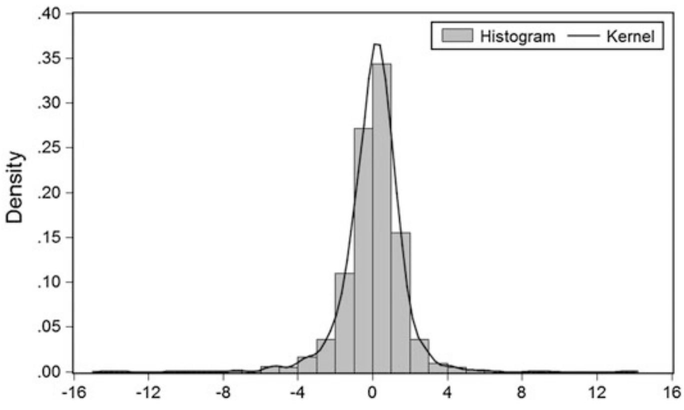


Fig. 7.1 Histogram of the NSE 500 daily returns, 1999–2014

returns depicts the distribution of the returns being characterized by a high peak at the centre. In sum, the returns exhibit volatility. Hence, the null hypothesis (H_0) stands rejected.

Having established the presence of conditional heteroscedasticity in the returns, hypothesis H_1 is accepted.

Figure 7.2 presents the time path of the NSE 500 index daily returns. It graphically indicates that the periods of low returns are followed by periods of low returns and that of high returns are followed by periods of high returns, respectively. Thus, 'volatility clustering' is evident, validating the acceptance of hypothesis H_2. The same is further tested by employing the Ljung-Box Q^2 statistic (Annexure 7.2) for different lag values to test the null hypothesis of no autocorrelation in the standardized squared residuals. The rejection of null hypothesis (due to a p-value of 0.000 which is less than the required value of 0.05 for significance) statistically establishes the presence of 'volatility clustering' in the return series. Further, Fig. 7.3 corroborates the same through the depiction of volatility patterns in the daily stock returns. In application terms, this indicates that positive returns were typically followed by further positive returns (signalling the presence of bullish phase) and negative returns were followed by further negative returns (indicating the presence of a bearish phase) in the stock market over the period of the study.

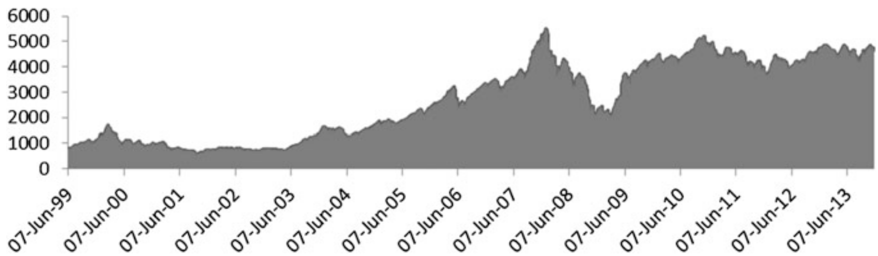


Fig. 7.2 Time Path of the NSE 500 daily closing prices, 1999–2014

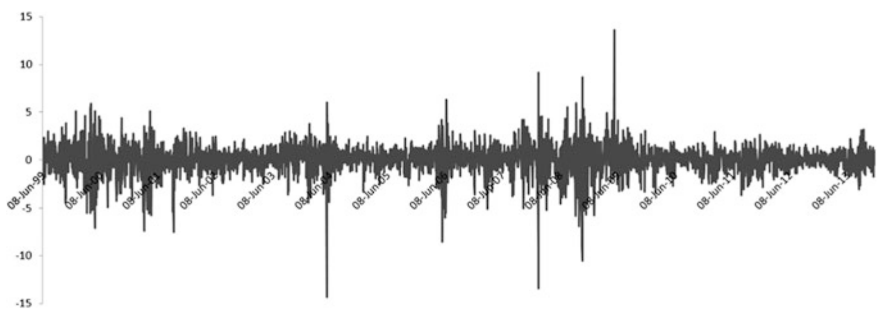


Fig. 7.3 Volatility patterns (deviations) of the NSE 500 index based on daily closing prices, 1999–2014

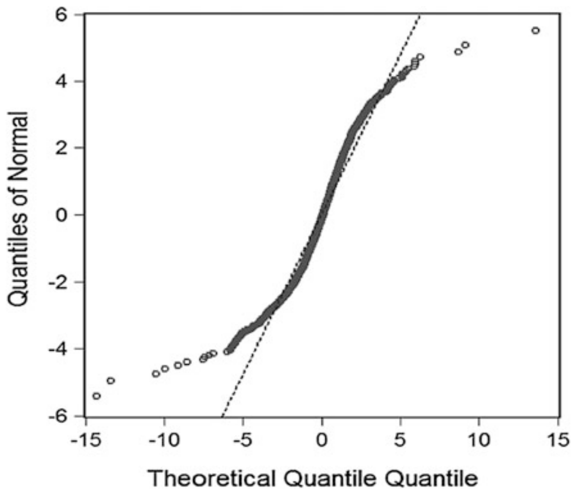


Fig. 7.4 Q–Q plot of daily closing prices of the NSE 500 index, 1999–2014

To test hypothesis H_3, the Quantile–Quantile (Q–Q) plot (Fig. 7.4) is deployed to check whether the empirical distribution of the NSE 500 index returns and the simulated Gaussian (normal) distribution returns were of the same type. The non-linear plot provides evidence that the NSE 500 index returns' distribution tails are heavier than the tails of the Gaussian distribution as there is a substantial deviation from the 45°. The plot further indicates that the impact of negative shocks is much greater than the positive shocks in driving the departure from normality. This is an indication of the 'leverage effect'; such an impact is also visible/evident in the returns. The Q–Q plot coupled with the JarqueBera test for normality confirms that daily returns have thick tails and a non-Gaussian distribution. Further, the deployment of Lagrangian multiplier test (Annexure 7.3) also indicates the presence of ARCH effects which is significant (due to a p-value of 0.000 which is less than 0.05). Hence, hypothesis H_3 indicating 'leverage effect' is accepted. In operational terms, it indicates that the market returns fell at a steeper rate following negative news in the market compared to the rise in returns following positive news, during the period of the study under reference.

Having witnessed the 'volatility clustering' and the 'leverage effect', the 'stationarity' of the returns has been explored through the Augmented Dickey–Fuller (ADF), Philips–Perron (PP) and the Kwiatkowski–Phillips–Schmidt–Shin (KPSS) statistics (Annexure 7.4). The results indicate the presence of 'stationarity' as the statistic values of all three tests are less than 0, (which is the significance criteria) establishing 'stationarity' in the returns.

Section IV: Summary

The findings of the chapter are important from the following viewpoints. It undertakes an examination, perhaps for the first time in the Indian context, of the behaviour of returns and their volatility patterns (if any) for the NSE 500 index. Also, the analysis presents the behaviour of returns in the Indian stock market in a comprehensive manner bringing forth evidences of ‘volatility clustering’, ‘stationarity’ and the ‘leverage effect’ in the volatility exhibited in the return series.

Put simply, the NSE 500 index returns are volatile and behave in the following manner:

- Whenever volatility is observed, it appears in a cluster; that is, the variations appear together indicating that the market goes through a volatile ‘phase’. Technical investors may use this ‘phase’ to book returns and fundamental investors may need to wait out this volatile cluster, in order to book returns; they may even exit the market if the prices exhibit a relatively upward trend.
- Further, there is evidence of ‘stationarity’ (referring to a sort of lag in the volatility cluster) indicating that the volatility cluster provides a window for aggressive trading to be able to book returns especially for technical investors.
- The ‘leverage effect’ indicates that investors react more strongly to negative information or news; their behaviour is pessimistic and they bring prices down sometimes by a larger extent that what is expected. On the other hand, when compared to positive or good news, the optimism reflected in increasing prices is of a lesser degree.

The findings are in accordance with the findings of Campbell and Hentschel (1992) and Engle and Ng (1993) with regard to the presence of ‘volatility clustering’ and to the findings of Black (1976), Christie (1982) and Rabemananjara and Zakoian (1993) pertaining to the ‘leverage effect’ being evident in the return series.

Annexure 7.1: Glossary of Terms

S. no.	Terms	Meaning
1	Heteroscedasticity	A collection of random variables is heteroscedastic if there are subpopulations that have different variabilities from others
2	Leptokurtosis	Leptokurtosis deals with distributions having fatter tails and narrower and higher ‘peakedness’ at the mean compared to a normal distribution
3	Leverage effect	The condition where the impact of negative shocks is much greater than the positive shocks in driving the departure from normality or vice versa

(continued)

(continued)

S. no.	Terms	Meaning
4	Mean-reverting	'Mean-reverting' behaviour of volatility suggests there is a normal level of volatility and deviations from that level are eventually cleared
5	Stationarity	The overall condition wherein the time series appears to have been drawn from a 'stationary' process, that is, a stochastic process where the joint probability distribution does not change when shifted in time and space
6	Volatility	A statistical measure of the dispersion of returns for a given security or a market index
7	Volatility clustering	The phrase 'volatility clustering' implies that periods of high (low) volatility are followed by periods of high (low) volatility, suggesting the presence of strong clustering of high and low fluctuations of the variable concerned

Annexure 7.2: Ljung-Box Q^2 Statistics

Ljung-box statistics	Test statistic	*p*-value
Q, 12	209.02	0.000
Q, 24	248.64	0.000
Q, 36	260.42	0.000
Q, 48	296.31	0.000
Q, 72	332.09	0.000
Q, 96	352.51	0.000
Q, 120	382.83	0.000
Q, 144	433.08	0.000
Q, 168	483.08	0.000
Q, 192	483.08	0.000
Q, 200	500.59	0.000

Annexure 7.3: Lagrange Multiplier Test

Lagrange multiplier test	Test statistic	*p*-value
LM, 5	40.51826	0.000
LM, 10	23.10503	0.000
LM, 20	13.26816	0.000
LM, 30	9.091963	0.000

(continued)

(continued)

Lagrange multiplier test	Test statistic	*p*-value
LM, 40	7.006252	0.000
LM, 50	5.976162	0.000
LM, 60	5.184236	0.000
LM, 70	4.73443	0.000
LM, 80	4.238505	0.000
LM, 90	3.867223	0.000
LM, 100	3.627176	0.000

Annexure 7.4: Stationarity Test Statistics

Tests	Statistic value
ADF test for 1 lag (intercept and trend)	−39.04482
Philips–Perron (PP) test (intercept and trend)	−47.04032
Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test statistics	0.076364

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Chapter 8
Level of Market Efficiency Using 'Rational Bubbles' Approach

Warren Buffett, the legendary investor and fund manager, was quoted as stating:

> When the price of a stock can be influenced by a 'herd' on Wall Street, with prices set at the margin by the most emotional person or the most depressed person, it is hard to argue that the market always prices rationally. In fact, market prices are frequently nonsensical" (Hagstrom 2000). This quote puts forth, in simple yet succinct terms, the aspect of market inefficiency.

In an efficient market, the stock prices contain all the publically available information and insider information, and the changes in stock prices can only be in response to new publically available information. The objective of this chapter is to test the presence of 'rational bubbles' (in the Indian stock market), in order to assess the level of stock market efficiency, using both linear and nonlinear threshold approaches.

The last two decades (1994–2014) have seen a paradigm shift in the attitude of investors towards investing in emerging equity markets. Emerging markets like India provide a plethora of new opportunities to the investors vis-a-vis developed markets. Given this attitudinal shift, it is important to assess the market efficiency in the emerging markets (like India).

There exist two groups of investors in the market. Whilst the first set of investors is interested in future payoffs (dividends), the other category is interested in profit-making by continuously buying and selling of shares (capital gains). If the first group dominates the market, the stock prices are by and large, driven by fundamentals. In case the second group dominates, the stock prices diverge from their fundamental values; these are driven, by and large, by non-fundamental speculative factors. It is these non-fundamental speculative factors that lead to a 'bubble'. In the context of this study, 'rational bubbles' are defined on the lines of Blanchard and Watson (1982). The presence of 'rational bubbles' is an indication of market inefficiency.

This chapter is organized into six sections. Section I contains the introduction; Section II is devoted to the literature review. Whilst Section III enumerates the methodology used for analysis, Section IV presents the statistical models adopted to

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test the existence of ‘rational bubbles’. The calculations based on the models and their interpretation form the subject matter of Section V. The summary is presented in Section VI.

Section I: Introduction

‘Rational bubbles’ in the stock markets have assumed significance, especially, after the subprime crises of 2007. They can be defined as ‘self-fulfilling expectations that push stock prices towards a level, which is unrelated to the change in the market fundamentals’. It is usually characterized by a rapid increase in prices followed by a drastic fall, after which the prices return back to their mean level (Blanchard and Watson 1982).

However, ‘bubbles’ are not a very recent phenomenon. The earliest documented record of the existence of price bubbles dates back to the ‘Tulip mania’ that occurred in Holland in the early 1600s. Since then, the ‘South Sea company’ and the ‘Railway mania’ price bubbles in Britain in 1720–1721 and in the 1840s, respectively, were witnessed. The first ‘stock market bubble’ was observed in the USA around the 1920s, followed by the ‘asset price’ bubble in Japan in the 1980s and during the ‘Asian crises’ of 1997.

The methodologies to test the presence of ‘rational bubbles’ consist of a range of linear (symmetric adjustment) and nonlinear (asymmetric adjustment) cointegration approaches.

Section II: Literature Review

The literature review can broadly be divided into ‘rational bubbles’ and share price changes.

Rational Bubbles

Topol (1991) suggested that the common partial assumption for bubble formation was a weak-financial policy and excessive monetary liquidity in the financial system, implying low interest rates and excessive leverage. Topol’s assumption can be regarded as a necessary condition for the existence of a bubble, but it does not appear to be a sufficient condition. Several other theoretical reasons have also been attributed to the existence of ‘rational bubbles’ in the market. Most of these theories have their genesis in the field of ‘Behavioural Finance’. The ‘greater fool’ theory, the ‘herding’ theory, the ‘extrapolation’ theory and the ‘moral hazard’ theories are four major theories; these theories (taken together) have potentials to explain the

existence of 'rational bubbles' in the market. These are based on the existence of 'animal spirits' in the market as explained by Keynes (1935). For the brief definitions of the mentioned theories and terms, please refer to Annexure 8.1.

A substantial amount of empirical research has been devoted to detect the presence of 'rational bubbles' in the stock market. The results have been mixed. The study conducted by Campbell and Shiller (1987) detected the presence of a 'bubble' in the United States (US) stock market, whilst the one conducted by Diba and Grossman (1988) rejected it. Froot and Obstfeld (1991) observed evidence of over-reaction in the stock prices due to changes in the dividends using the Standard & Poor's (S&P) stock prices and the dividend indices from 1900 to 1988. Yangru (1997) reported evidence for the existence of 'bubbles' in certain time periods using S&P 500 index over the period of 1871–1992. Several other studies in this area have been done by Timmermann (1995), Crowder and Wohar (1998), Bohl (2003), Nasseh and Strauss (2004), Cunado et al. (2005), Mokhtar et al. (2006) and Chang et al. (2007).

Most of these studies were based on the assumption of the presence of a linear cointegrating (symmetric adjustment) relationship between stock prices and dividends. However, there appears to be no justification to assume that the economic systems are linear (Barnett and Serletis 2000). 'It seems to be generally accepted that economics is nonlinear' (Granger and Terasvirta 1993). Researchers like Hsieh (1991) and Abhyankar et al. (1997) empirically demonstrated that the financial time series were nonlinear. Bierens (1997) provided evidence that when the actual direction of adjustment was nonlinear in the cointegrated relationship, using the conventional linear cointegration framework led to the misspecification problem. Balke and Fomby (1997) noted a loss in power in conventional cointegration tests when the underlying process was threshold autoregressive in nature.

Ahmed et al. (1998) reported the presence of 'bubbles' in the ten Pacific-rim countries using the 'regime-switching' model. Boucher (2007) reported evidence of mispricing due to cognitive errors or sentiments. Liu and Chang (2008) deduced the absence of 'rational bubbles' in the Korean stock market using nonlinear and nonparametric tests. Onour (2009) supported the presence of 'rational bubbles' at the Bombay stock exchange (BSE).

Apart from the psychological theories, several other researchers explained the existence of 'bubbles' based on the technological and economic development and market inefficiency. Other theories described 'rational bubbles' a result of market manipulation in the presence of an 'informal monopoly', 'informational oligopolies', 'rational government induced policy', 'imminent revolution', and the 'ruling elite' (Thompson and Hickson 2006).

Chang et al. (2014) rejected the existence of 'rational bubbles' using the supremum augmented Dickey–Fuller (SADF) test, but noted their presence based on the generalized supremum augmented Dickey–Fuller (GSADF) test (both tests were suggested by Philips et al. (2011, 2013), respectively). However, the existence of 'rational bubbles' in India, on a priori basis, seems impossible as India has high

interest rates, implying that the necessary condition for the existence of bubbles as suggested by Topol (1991) is not present in the Indian stock market.

Share Price Changes

Gordon (1959) measured the relative valuation of dividends and capital gains in the stock market, using a variant of the capital asset pricing model (CAPM). They observed that dividends were not valued differently from capital gains. This finding was consistent with the objective of share price maximization by firms. Miller and Modigliani (1961) documented that the effect of a firm's dividend policy on the current price of its shares was important not only to the corporate managers but also to investors planning portfolios, and further to the economists seeking to understand and appraise the functioning of the capital markets. Similar findings were also reported by Penman and Sougiannis (1997) and Harris et al. (2001).

Praetz (1972) presented both theoretical and empirical evidence about a probability distribution which described the behaviour of share price changes. Schipper and Smith (1986) analysed the share price reactions of the parent firms to the announcements of public offerings of the stock of wholly owned subsidiaries. The average abnormal gains associated with 'equity carve-out' announcements contrasted with the average abnormal losses documented upon announcements of public offerings of parent equity. Blume et al. (1989) observed that the price of a typical stock that was added to or deleted from the index and required maximum trading did not adjust fully immediately after the announcement nor had it fully adjusted by the opening on the change date. This finding suggested that an indexer could enhance the realized returns by buying at the opening date following the announcement rather than waiting until the close on the change date.

Greig (1992) re-examined the Ou and Penman (1989) conclusion that fundamental analysis identified equity values not currently reflected in stock prices, and thus systematically predicted abnormal returns. Bernheim and Wantz (1995) proposed and implemented a new dividend signalling hypothesis. It implied that an increase in the dividend taxation increased the share price response per dollar of dividend; it was referred to as 'bang-for-the-buck'. Their findings were in tune/conformity with the signalling hypothesis. Lynch and Mendenhall (1997) analysed price and volume data for firms added to and deleted from the S&P 500 index since 1989 for a distinct pattern of stock price movements. The price reversal after addition and deletion strongly suggested the existence of temporary price effects, caused by index-fund trading associated with S&P 500 composition changes.

Trueman et al. (2003) studied the pricing of Internet firms around their earnings announcements. The stock prices of Internet firms increased during 5 days prior to the earnings announcement and decreased in the 5 days following the announcement. On considering several potential explanations for the observed price patterns, it was concluded that price pressure (due to investor optimism and share demand)

was the only parameter that received some support. Berger (2003) extended this study and focused on the major concerns raised by the price pressure explanation offered.

Goyal and Welch (2003) observed that the primary source of poor predictive ability was parameter instability; for example, the dividend yield (as a parameter) failed to forecast annual returns or dividend growth rates. Annaert et al. (2012) introduced a new monthly return series for the Belgian owned equity based on the Brussels stock market data for the period 1832–1914. Dividend income was observed to constitute the major part of total returns and the dividend distributions had a clear seasonal pattern.

Savor (2012) studied how information presence affected the post-event performance of stocks experiencing large price changes, using regression analysis. He focused on stocks that experienced major price changes. Using analyst reports as a proxy, he observed that price events accompanied by information were followed by drift, whilst no-information ones resulted in reversals. Thus, the results implied that investors under-reacted to news about fundamentals and over-reacted to other 'shocks' that moved stock prices.

Wahal and Yavuz (2013) analysed the role of style-based investing on asset-level return predictability. 'Style' investing refers to an investment approach in which the rotation amongst different 'styles' is supposed to be important for successful investing, for example, placing money in the broad category of assets, such as 'growth' or 'emerging markets'. They based their paper on the prediction provided by Barberis and Shleifer (2003) that under certain conditions, style investing could generate predictability in returns. They concluded that investing behaviour in which investors chased style returns amplified the waves in asset returns.

Singh et al. (2015) studied Indian equity returns and their characteristics, for the past two decades (1994–2014) and observed the presence of 'volatility clustering', 'leveraged effect' and 'stationarity' in their behaviour. The findings are also reported in Chap. 7.

Section III: Methodology

The research methodology adopted in this chapter to analyse the presence of 'rational bubbles' in the Indian stock market has been delineated in this section.

Scope

The NSE 500 index of India comprises of the top 500 companies listed on the NSE based on their market capitalization. The total traded value for the last six months ending December 2013, of all Index constituents, was approximately 97.01 % of the

traded value of all stocks on NSE (Source: National Stock Exchange (NSE) Website. http://www.nseindia.com/products/content/equities/indices/cnx_500.htm).

The sample is representative in nature as the NSE 500 companies represent all industry groups. The period of the study is 1996–2014. This universe has been chosen as it is most likely to be an accurate representation of the Indian stock market (given the above facts).

NSE 500 Index Background

The company Standard & Poor's (S&P) introduced its first stock-based index in 1923 in the United States of America (USA). Its Indian counterpart, the CNX 500 (hereby referred to as NSE 500), is India's first broad-based benchmark of the Indian capital market. The index has traditionally been market-value weighted, stocks with higher market capitalizations have a greater effect on the index than companies with smaller market capitalizations. However, the index is now float weighted. That is, S&P now calculates the market capitalizations relevant to the index using only the number of shares (called 'float') available for public trading. This transition was made in two steps, the first on 18 March 2005 and the second on 16 September 2005 (Source: Wikipedia Website. http://en.wikipedia.org/wiki/S%26P_CNX_500).

Secondary Data and Analysis

The basic computation of returns is for individual companies.

Share Prices

The share prices used in the computations are the average of the respective month's high and low prices. It is useful to mention here that the use of the month's 'average' price has important advantages over the alternatives of using share prices at some fixed date, say, the month-end. As a large proportion of the listed shares in India are the shares of small- and medium-sized companies and are not traded daily, the use of share prices on a fixed date would have resulted in exclusion of such shares from the study. Also, prices at any particular point of time are liable to be affected by chance factors. Tests conducted by Gupta and Choudhary (2000) have shown that the average of the high and low prices quite closely approximate the average based on more frequently collected price quotations, such as daily, weekly or monthly prices.

Dividends

The cash dividends are taken into account in the respective months and are not assumed to be reinvested.

Transaction Costs and Taxes

Brokerage, other transaction costs and personal income tax have not been factored in the computation of returns. Whilst the reason for excluding brokerage and other transaction costs is logistic convenience, the reasons for income tax are two: first is that the personal income tax rates vary from investor to investor and second is that dividends were free of tax during the major period of the study under reference.

Tests for Existence of Rational Bubbles

For the purpose of this study, the existence of 'rational bubbles' is checked by identifying the presence of a cointegrating relationship between stock prices and dividends. Cointegration is a statistical property of time series variables. Two or more time series are cointegrated if they share a common stochastic drift. For example, if two or more series are individually integrated (in the time series sense) but some linear combination of them has a lower order of integration, this signifies an equilibrium relationship between the original series, which are then said to be cointegrated (Source: Wikipedia Website). For the purpose of the analysis, 'rational bubbles' would exist if the stock prices and dividends are *not* cointegrated.

Data Analysis

The Indian stock market has already entered into the trillion dollar club as on 20 May 2014 forming around 2.2 % of the world market capitalization (Source: National Stock Exchange (NSE) Website. http://www.nseindia.com/products/content/equites/indices/cnx_500.htm). The analysis is based on monthly stock prices and dividends data for the NSE-based CNX-500 index from January 1996 to April 2014. For computation, the financial statistics software R® version 2.15.3 package 'apt' has been used. The descriptive statistics of the data is as presented in Table 8.1. Natural logarithm of stock prices and dividends are used in the analysis to minimize the heteroscedasticity.

It is evident from Table 8.1 that the mean log stock price is more than twice the mean log dividends. The standard deviation in both the variables is low and the skewness is nearly zero. The kurtosis indicates that both prices and dividends have hovered around the low mean value. The same is also corroborated by the low

Table 8.1 Descriptive statistics of log (price) and log (dividends)

Statistic	Ln (price)	Ln (dividend)
Mean	7.74	3.62
Standard error	0.05	0.04
Median	7.63	3.66
Standard deviation	0.72	0.56
Kurtosis	−1.67	−1.26
Skewness	0.08	−0.03
Minimum	6.71	2.58
Maximum	8.81	4.56
Count	220.00	220.00

difference between the minimum and maximum prices. This implies that prices have been much higher than the amount of dividends. Further, it is reasonable to infer than prices dominate the returns vis-à-vis dividends as the source of income for the investors.

Section IV: Statistical Models Used to Test the Presence of 'Rational Bubbles'

The model for net returns is formed on the lines of Campbell et al. (1997), Cunado et al. (2005) and Koustas and Serletis (2005). The simple stock return is defined as the summation of capital gain and the payouts in form of dividends relative to the initial investment (as shown in Eq. 8.1).

$$R_{t+1} = \frac{P_{t+1} - P_t + D_{t+1}}{P_t} = \frac{P_{t+1} + D_{t+1}}{P_t} - 1 \tag{8.1}$$

where R_{t+1}, P_{t+1} and D_{t+1} denote the stock return, stock price and dividend in the period t + 1, respectively. Taking the mathematical expectation of Eq. (8.1), based on all the information at time t, it can be rewritten as follows:

$$P_t = E_t\left[\frac{P_{t+1} + D_{t+1}}{1 + R_t}\right] \tag{8.2}$$

Solving Eq. (8.2) forward for k periods, the reduced form is obtained as follows:

$$P_t = E_t\left[\sum_{i=1}^{i=k}\left(\frac{1}{1 + R_{t+i}}\right)^i D_{t+i}\right] + E_t\left[\left(\frac{1}{1 + R_{t+k}}\right)^k P_{t+ki}\right] \tag{8.3}$$

Equation (8.3) in its indefinite form can be written as follows:

$$P_t = \lim_{k\to\infty} E_t\left[\sum_{i=1}^{i=k}\left(\frac{1}{1+R_{t+i}}\right)^i D_{t+i}\right] + \lim_{k\to\infty} E_t\left[\left(\frac{1}{1+R_{t+k}}\right)^k P_{t+ki}\right] \tag{8.4}$$

If positive returns are assumed at the end period, it can be assumed that the expected discounted value of the stock in the indefinite future converges to zero, and Eq. (8.4) can be rewritten as follows:

$$P_t^1 = E_t\left[\sum_{i=1}^{i=\infty}\left(\frac{1}{1+R_{t+i}}\right)^i D_{t+i}\right] \tag{8.5}$$

Equation (8.5) can be described as the fundamental value of the stock as expected present value of future dividends.

In the absence of convergence assumption, Eq. (8.3) can lead to an infinite number of solutions, and any of them can be written in the form:

$$P_t = P_t^1 + B_t, \quad \text{where } B_t = E_t\left[\frac{B_{t+1}}{1+R_{t+1}}\right] \tag{8.6}$$

The extra term B_t is described as 'rational bubbles', as it denotes the amount of deviation in the price of a stock from its fundamental value as denoted in Eq. (8.5) in response to extraneous factor(s) and is consistent with the rational expectations and the time path of expected returns. If the non-stationarity of stock prices can be accounted for by the non-stationarity in dividends, then the stock prices and dividends are said to be cointegrated.

The null hypothesis of 'rational bubbles' can either be checked by testing for the cointegrating relationship between dividends and stock prices or by checking if the stock dividend–price ratio is a stationary series. The presence of the stationarity of dividend–price ratio or the cointegration of stock prices and dividends is inconsistent with the presence of 'rational bubbles' as discussed earlier.

Unit Root Test

Before checking for cointegration, it is important to test the order of integration of both the series; the reason is that if both the series are of the order 0, there cannot exist a cointegrating relationship between them. In other words, cointegration in this context would mean that the dividend payments series and the stock prices' series would move in tandem over time. To check for the order of integration the augmented Dickey–Fuller (ADF) test is applied. The ADF test was presented by Dickey and Fuller (1981) as an improvement over the traditional Dickey–Fuller (DF) test. The ADF test, tests for the null hypothesis of presence of unit root in the given time series Y via the following three specifications:

(i) Without drift and linear time trend:

$$\Delta y_t = (\delta)y_{t-1} + \beta_i \sum_{i=1}^{m} \Delta y_{t-i} + u_t \tag{8.7}$$

(ii) With drift:

$$\Delta y_t = \alpha + (\delta)y_{t-1} + \beta_i \sum_{i=1}^{m} \Delta y_{t-i} + u_t \tag{8.8}$$

(iii) With drift and linear time trend:

$$\Delta y_t = \alpha + \gamma t + (\delta)y_{t-1} + \beta_i \sum_{i=1}^{m} \Delta y_{t-i} + u_t \tag{8.9}$$

The value of 'm' is chosen based on information criteria such as the Akaike information criteria (AIC) or the Schwarz–Bayesian information criteria (SIC). In Eqs. (8.8) and (8.9), we check for the null hypothesis $H_o : \delta = 0$, against the alternative $H_{\mathrm{a}} : \delta < 0$. The rejection of the null hypothesis implies that the residual series has no unit root and is stationary. Hence, the series X and Y are cointegrated and have a long-run relationship.

Tests for Cointegration

There are five methods for testing cointegration. These methods have now been described:

1. **Engle–Granger Two-Step Test**

If two time series x_t and y_t are cointegrated, a linear combination of them must be stationary. In other words,

$$y_t - \beta x_t = u_t \tag{8.10}$$

where u_t is stationary.

If u_t was known, it could be tested for stationarity using the Dickey–Fuller test, for example. Also, β is not known and it is possible to estimate by using the method of ordinary least squares (OLS). After calculating beta, the stationarity test can be applied on the estimated u_t series.

2. **Phillips–Ouliaris Test**

Multicointegration extends the cointegration technique beyond two variables, and occasionally to variables integrated at different orders. Further, cointegration

assumes that the cointegrating vector is constant during the period of study. However, it is possible that the long-run relationship between the underlying variables changes.

In the context of this chapter, however, this test is not applied as here only two variables are considered, viz., stock price and dividend.

3. **Autoregressive Distributed Lag (ARDL) Test**

The ARDL tests of Pesaran and Smith (1998) and Pesaran et al. (2001) estimate the presence of long-run relationships between economic time series. It is a better approach than Engle–Granger (1987) test as it does not assume that all the variables have to be $I(1)$. Some of the variables under consideration can be stationary under ARDL approach; however, none of the variables can have an order of integration greater than one. It is a one-step procedure and involves formulating the following regression model:

$$\Delta Y_t = \alpha_0 + \sum_{i=1}^{i=p} \alpha_{1i}\Delta Y_{t-i} + \sum_{i=1}^{i=q} \alpha_{2i}\Delta X_{t-i} + \beta_1 Y_{t-1} + \beta_2 X_{t-1} + u_t \tag{8.11}$$

To investigate the presence of cointegration between X and Y, bound testing as specified by Pesaran et al. (2001) is used. The null hypothesis is tested as follows:

$$H_o : \beta_1 = \beta_2 = 0 \tag{8.12}$$

The ARDL bound test is based on the Wald test (F-statistic). When the computed F-statistic is greater than the upper-bound critical value, the null hypothesis is rejected and vice versa. When the computed F-statistic falls between the lower and the upper bounds, the result is inconclusive.

4. **Johansen–Juselius (JJ) Test**

JJ test presented by Johansen and Juselius (1990) is a better approach than ARDL in the sense that it is effective even if the order of integration of variables is greater than 1. Secondly, it can also test if there are more than one cointegrating relationships present between the variables.

5. **Threshold Autoregression (TAR) Test**

Threshold-based cointegration test is an advanced nonlinear methodology that does not assume a symmetric adjustment between the variables. It was proposed by Enders and Siklos (2001). It is a two-step procedure. In the first step, we estimate the following long-run relationship between X and Y:

$$Y_t = \alpha + \beta X_t + u_t \tag{8.13}$$

where u_t is the normally distributed error term.

In the second step, we obtain the OLS estimates of ρ_1 and ρ_2 as per the following equation:

$$\Delta\hat{u}_t = I_t\rho_1\hat{u}_{t-1} + (1 - I_t)\rho_2\hat{u}_{t-1} + \sum_{i=1}^{i=k}\gamma_i\Delta\hat{u}_{t-i} + v_t \tag{8.14}$$

where v_t is a white-noise disturbance.

The residuals in Eq. (8.13) are substituted in Eq. (8.14). The necessary condition for u_t to be stationary is $-2 < (\rho_1, \rho_2) < 0$. Enders and Granger (1998) and Enders and Siklos (2001) agree on the fact that in either case, under the null hypothesis of $\rho_1 = \rho_2 = 0$, the series has a non-standard distribution. The rejection of both the hypotheses indicates the existence of threshold cointegration with asymmetric adjustments.

Further, this model is important when the adjustment is asymmetric with the series exhibiting more ‘momentum’ in one direction than in the other (Enders and Granger 1998). This class of threshold models is referred to as momentum-threshold autoregression (M-TAR) models. The TAR model can capture the deep cycle process and M-TAR representation is able to capture sharp movements in a sequence. The value of threshold is generally unknown a priori and is obtained by Chan’s (1993) method to search amongst possible threshold values to minimize the residual sum of squares from the fitted model.

Section V: Results and Discussion

This section presents the tests applied and their results along with their interpretation.

All calculations and models are run on the financial statistics software R® version 2.15.3 package ‘apt’. Since the detailed statistical calculations behind each test have already been outlined in the previous section, this section focuses only on the results and their interpretation. The detailed calculations are presented through Annexures 8.2–8.9.

Unit Root Test

As highlighted earlier in the text, the first step in determining the existence of ‘rational bubbles’ is to compute the order of integration between the time series of stock prices and dividends. The unit root tests for stock price and dividend for different specifications of the ADF test are presented in Annexure 8.2. Both the natural log of stock prices and dividends are $I(1)$ and not 0; hence, there could be a case for ‘rational bubbles’ here.

Threshold Autoregressive (TAR) Test

The results of the TAR model are presented in Annexure 8.3. It rejects the null hypothesis of symmetric adjustments.

However, along with the rejection of the null hypothesis of symmetric adjustment, it is important to note that equity returns in India over the past two decades have exhibited evidence of ‘volatility clustering’, ‘leverage effect’ and ‘stationarity’ (Singh et al. 2015) indicating the presence of sharp asymmetric movements (for details, please refer to Chap. 7 on ‘Volatility in Stock Returns’). Hence, it was considered useful to apply the momentum-threshold autoregressive (M-TAR) test for cointegration to check for asymmetric adjustments (if any).

Momentum-Threshold Autoregressive (M-TAR) Test

The M-TAR model (results presented in Table 8.2) has greater power than linear tests and TAR-based cointegration test, especially in the presence of sharp movements.

10,000 Monte Carlo simulations were performed to generate 5 and 10 % critical values as in Enders and Siklos (2001). Based on the results of M-TAR tests, it may be concluded that there is a long-run asymmetric relationship between stock prices and dividends at 10 % level of significance. Hence, based on the evidence of an asymmetric cointegration relationship, the existence of ‘rational bubbles’ may be rejected within the 90 % confidence interval. The probable reason behind the evidence of cointegration using the M-TAR model vis-à-vis the TAR model could be the aspect that there might exist sharp movements in the time series of stock prices and dividends instead of deep cycle movements and, the M-TAR model is better in capturing such movements.

M-TAR Error Correction Model

Next, the M-TAR-based error correction model (ECM) was deployed to confirm the findings. It was established that the speed of adjustment for deviations below the threshold value is faster than the speed of adjustment above the threshold value.

Table 8.2 Results of M-TAR cointegration test

Null hypothesis	Statistic	Critical value*	Critical value**
Presence of symmetric adjustment	4.364**	8.130	2.718
There is no cointegration	6.238**	8.016	5.384

*, ** denote simulated critical values for 5 and 10 % significance level

The results of M-TAR ECM are presented in Annexure 8.4. The estimated coefficients of the error correction terms in the two regimes determine the speed of adjustment for positive and negative deviations from the fundamental value. The coefficients of the error correction term in the lower regime are greater in magnitude than the coefficients of the error correction term in the lower regime, in both Models 1 and 2. This implies that the speed of adjustment for negative deviations is faster; that is, negative deviations from the fundamental values are eliminated faster than the positive deviations. In simple terms, this means that the stock market is able to revert back to the average return values faster from negative or lower deviations, and it takes longer to revert back to average values when the deviations are positive. In the long run, it is perhaps safe to assume that such a behaviour is an indication of a bullish stock market.

The summaries of diagnostic tests for M-TAR model estimated in Annexure 8.4 are presented in Annexure 8.5. Next, the Granger causality and equilibrium path asymmetry was checked for. The results are reported in Annexure 8.6.

Based on results of Annexure 8.6, a unilateral causality running from stock prices to dividends may be established. Also, an equilibrium adjustment path asymmetry for dividends may be observed. Hence, it may be safe to conclude that the adjustments in dividends to their equilibrium level follow an asymmetric path; and, the stock price is responsible for most of the adjustments. The results are indicative of the important role played by price adjustment in the Indian stock market. They are also indicative of the status of the market efficiency.

Since conventionally the linear approaches are also applied before the nonlinear approaches, the linear approaches, viz., the Engle–Granger two-step test, autoregressive distributed lag (ARDL) test and the Johansen–Juselius (JJ) test, were also applied and their results presented in Annexures 8.7–8.9, respectively. Though these tests did indicate a possible presence of 'rational bubbles', only the JJ test did so conclusively. However, by and large, the tests based on asymmetric relationship reject the presence of 'rational bubbles' in the Indian stock market.

Section VI: Summary

There are two notable findings that emerge as a result of the analysis. First, 'rational bubbles' do not exist in the Indian stock market. Second, a cointegrating relationship between the prices and the dividends, with an asymmetric adjustment characterized by sharp movements, is established.

The first finding finds basis in the assumption made by Topol (1991) indicating that the common partial assumption for bubble formation is a weak-financial policy and excessive monetary liquidity in the financial system, implying low interest rates and excessive leverage. There is, however, a prevalence of high interest rates in the Indian capital markets, thus rendering this assumption true.

The nonlinear M-TAR approach was able to reject the null hypothesis of cointegration; it is being flexible enough to identify nonlinear adjustment patterns

with sharp movements. Further, the results indicate that the negative deviations from the fundamental values are adjusted faster as against positive deviations and the price (and not the dividend) is responsible for most of the adjustments. This is an evidence of the 'leverage effect' which was also reported in of Chap. 7.

The above discussion could make the case for a semi-strong form of efficiency, considering the price-adjusting nature of the stock market. However, the chapter on price multiples (Chap. 6) indicates that most stocks in the market are either over-valued or undervalued; this indicates inefficiency in pricing. The findings of Chap. 5 (Disaggregative Analysis of Returns) also contain indications of 'age' and 'size' anomalies existing in the Indian stock market returns. Finally, the substantial volatility present in the Indian stock market weakens the case for 'semi-strong' level of efficiency. Hence, to conclude, the status of market efficiency for the Indian stock market, based on the findings, is not only from the deployment of the 'rational bubbles' methodology but also from the other aspects studied (as a part of this research effort) appears to be of the 'weak' form.

Annexure 8.1: Brief Definition of Theories and Terms

Name of theory	Definition
'Greater fool' theory	A theory that states it is possible to make money by buying securities, whether overvalued or not, and later selling them at a profit because there will always be someone (a bigger or greater fool) who is willing to pay the higher price
'Herding' theory	A mentality characterized by a lack of individual decision-making or thoughtfulness, causing people to think and act in the same way as the majority of those around them
'Extrapolation' theory	Extrapolation is the process of estimating, beyond the original observation range, the value of a variable on the basis of its relationship with another variable
'Moral hazard' theory	The risk that a party to a transaction has not entered into the contract in good faith; has provided misleading information about its assets, liabilities or credit capacity; or has an incentive to take unusual risks in a desperate attempt to earn a profit before the contract settles
'Animal spirits'	A term used by John Maynard Keynes used in one of his economics books. In his 1935 publication, 'The General Theory of Employment, Interest and Money', the term 'animal spirits' is used to describe human emotion that drives consumer confidence. According to Keynes, animal spirits also generate human trust

Source The Investopedia and Wikipedia Websites

Annexure 8.2: Augmented Dickey–Fuller (ADF) Test Results

Specification	Test at level data			Test at first differenced data		
Dependent variable	None	Intercept	Intercept and trend	None	Intercept	Intercept and trend
Log (dividend)	2.762	−0.892	−3.063	−14.089*	−14.590*	−14.561*
Log (price)	1.804	−0.673	−2.204	−14.385*	−14.546*	−14.518*

*Denotes significance at 99 % level of significance

Annexure 8.3: Results of TAR Cointegration Test

Null hypothesis	Statistic	Critical value*	Critical value**
There is no cointegration	4.168	7.044	6.008
Presence of symmetric adjustment	0.371	6.296	4.917

*, **Denote simulated critical values for 5 and 10 % significance levels

Annexure 8.4: Estimation Results of M-TAR Error Correction Model (ECM)

Dependent variable	Independent variable	Estimate	*t*-value	*p*-value
D(LN_DIV): Model 1	C	0.010*	3.188	0.002
	D(LN_DIV(-1))	0.030	0.438	0.662
	D(LN_PRICE(-1))	−0.069***	−1.659	0.099
	ECT (above threshold)	0.006	0.485	0.628
	ECT (below threshold)	0.050**	2.306	0.022
D(LN_PRICE): Model 2	C	0.006	1.219	0.224
	D(LN_DIV(-1))	0.134	1.208	0.228
	D(LN_PRICE(-1))	0.046	0.683	0.495
	ECT (above threshold)	−0.030	−1.396	0.164
	ECT (below threshold)	−0.080**	−2.290	0.023

*, **, ***Denote significance at 1, 5 and 10 % significance levels; *ECT* error correction term

Annexure 8.5: Summary and Diagnostic Checking for M-TAR Models (1 and 2)

Item	Model 1	Model 2
R-squared	0.040	0.050
Adj-R^2	0.020	0.030
F-stat	1.940	2.530
Durbin–Watson statistic	2.030	2.020
AIC	−725.920	−515.880
BIC	−705.610	−495.570
LB(4)	0.910	0.820
LB(8)	0.630	0.780
LB(12)	0.220	0.900

Note LB(j) denotes p-values for Ljung–Box statistic at jth lag

Annexure 8.6: Granger Causality and Path Asymmetry Test

Null hypothesis	F-statistic	Pr(>F)
Equilibrium adjustment path symmetry in dividends	2.942*	0.088
Equilibrium adjustment path symmetry in stock prices	1.502	0.222
Dividends does not Granger cause stock price	1.460	0.228
Stock price does not Granger cause dividends	2.752*	0.099

*Significant at 10 % level of significance

Annexure 8.7: Engle–Granger Test Results

Dependent	Tau-statistic	Probability	Z-statistic	Probability
Log_Price	−2.664736	0.2164	−13.43712	0.1917
Log_Dividend	−2.725527	0.1946	−13.51506	0.1889

Annexure 8.8: ARDL Bound Test Results

Variable	Coefficient	Standard error	*t*-statistic	Probability
C	0.142*	0.071	1.997	0.047
Ln_Price(-1)	−0.044*	0.018	−2.380	0.018
Ln_Dividend(-1)	0.056*	0.024	2.375	0.018
D(Ln_Price(-1))	0.046	0.067	0.684	0.495
D(Ln_Dividend(-1))	0.153	0.110	1.390	0.166

*Denotes significance at 5 % level of significance

Annexure 8.9: Johansen–Juselius Test Results

Hypothesized number of cointegrating equation(s)	Trace statistic	Probability	Max-Eigen statistic	Probability
None	8.827	0.382	8.625	0.319
At most 1	0.203	0.653	0.203	0.653

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Chapter 9
Concluding Observations

The objective of this chapter is to provide a bird's-eye view of virtually all the major aspects of returns in the Indian equity markets and their implications. The study is perhaps the first (in India) having the largest sample size consisting of the National Stock Exchange's (NSE) 500 index companies (representing almost 97 % of the market capitalization). Hence, the chosen sample virtually presents a census on equity market returns in India. The period of the study is spread over two decades (1994–2014) tracking returns right from the inception of the index till March 31, 2014. The period of the study has been subdivided into two phases to study the impact (if any) of recession.

Equity markets constitute the most important segment of stock exchanges; in fact, status of equity returns is, by and large, reckoned as a barometer of the state of the economy of a country. Returns earned by equity investors on their funds invested in equity markets would be a decisive factor in the growth of such markets. What has been the experience of Indian equity markets constitutes the subject matter of the present research monograph.

It would be useful for equity investors to know the expected returns (on a rational basis) and actual returns earned on their equity investments; equally important would be to have insight related to the risk–return trade-off involved in equity investment and the parameters that may affect the same. There are four major aspects of Indian equity markets which have been our primary focus in the present research work, namely returns on equity, price multiples, risk and the level of market efficiency.

In brief, the study focuses on the following:

- Rates of return on equity funds, from the corporates' perspective
- Expected rates of return on equity
- Market rates of return on equities from the investors' perspective
- Rates of return: disaggregative analysis

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- Analysis of price multiples
- Risk/volatility in stock returns
- Level of market efficiency using the 'rational bubbles' approach.

For better exposition, this chapter is divided into five sections. Section I presents the concluding observations on the different variants of the returns on equity. Section II summarizes the findings related to price multiples. Observations regarding risk/volatility in returns form the subject matter of Sect. III. Section IV assesses the level of market efficiency of the Indian equity market. Section V provides (in nutshell) the findings of this research work, its limitations and the scope of future work.

Section I: Returns on Equity

This is perhaps the first study in India that links the three aspects of returns in detail (viz., the returns that the companies actually earn, the returns the investors expect and the returns the markets provide). It is heartening to observe empirically that these three aspects are closely aligned in the Indian equity markets, making it an attractive investment destination.

It appears safe to postulate that the Indian equity markets provide, prima facie, adequate returns to the technical (short-term) investors and also allow returns over the long run to the fundamental (long-term) investors. However, in the presence of volatility in the short run which increases the risk, it would perhaps be wiser to invest in the long run in the Indian stock market. Such a strategy should result in relatively less risky and stable returns vis-à-vis the short-run returns.

The major findings related to all significant variants of rates of return on equity have been presented in this section.

(i) **Returns Earned on Equity Funds (ROEF) from the Corporates' Perspective**—The sample companies appear to be providing adequate returns to their owners adhering to the primary objective of maximizing the wealth of shareholders. Nearly seven-tenths of the sample companies report a ROEF of greater than 10 %, for the entire period of the study. Given the current interest rates prevailing in the capital market and social responsibilities the companies are to perform mandatorily, the average return on equity funds (ROEF) of 19.10 %, *prima facie,* can be considered satisfactory. It would perhaps be useful to note here that even though there was a drop in the ROEF, post-recession, the sample companies were still able to record the return of 16.86 %. The statistic of adequate returns can be construed as good news/signal for further growth of equity markets in years to come; in other words, the companies are in a comfortable position to meet cost of equity.

(ii) **Expected Returns**—Expected returns are a reflection of cost of equity and are conditional on the fundamental strength and financial performance of the underlying company whose shares the investors' purchase. Further, they are also dependent on the company's relative performance vis-à-vis the underlying market. We have used two measures to determine expected returns which consider both the aforementioned aspects: (i) return for the risk undertaken ($k_e = r_f + b + f$) and (ii) the capital asset pricing model (CAPM).

With regard to the aspect of being compensated for the risk undertaken, would an investor in India be satisfied with 8–10 % return on equity investment? The answer is likely to be in the negative; this rate of return can be easily earned by investing in debt instruments such as the public provident fund (PPF), the Indira Vikas Patra (IVP) and long-term deposit with commercial banks (with virtually full safety of investments). Obviously, the investors would like to be compensated for the extra risk they are assuming by investing in the equity shares of a corporate enterprise.

The risk undertaken was measured through the ratios of degree of operating leverage (DOL) and the degree of financial leverage (DFL). The average cost of equity over the period of the study (2001–2014) for the sample companies, computed via this measure, has been nearly 14 %, assuming the average risk-free rate to be 7.75 %. Obviously, the individual company's cost of equity would be dependent on its relative risk complexion, vis-à-vis the other securities available in the market. The same is also substantiated by the average expected returns computed via the CAPM.

The expected returns and the actual market index returns, by and large, appear to follow the same pattern. The average expected returns for the period are 13.47 % compared to average market index returns of 16.46 %. The standard deviations, coefficient of variation and variance figures are also similar, indicating that expected returns mirror the volatility present in the market. Further, the Pearson's correlation coefficient between expected and actual market index returns was 0.98. Hence, the CAPM model emerges to be an appropriate model to estimate expected returns in the Indian stock market. However, expectedly, the market index presents a volatility that is substantially higher than the expectations.

(iii) **Market Returns or Actual Returns (rates of return earned by equity shareholders)**—Market returns on equity perforce substantially surpass the other relatively less risky investment avenues (debt) available in India. The best annual interest rates available on 15, 10 and 5-year fixed deposits (to compare with the 15, 10 and 5-year equity holding periods) have been 10 % on an average over the study period. The average returns for the equity portfolios of these durations were 18.41, 19.62 and 17.33 %, respectively.

It is to be noted that interest earned on deposits is taxed in the hands of the investor in India, and so are the capital gains. At the time of writing this chapter, the interest income (taxed at the personal income tax slab of the individual) could attract a maximum tax rate of 30 %, whereas the long-term

capital gains tax was 20 %. It is evident from the tax rates that the after-tax computation of equity returns would be greater than the after-tax computation of interest income (assuming the highest tax slab rate of 30 %). The other advantage that accrues to equity investment is the liquidity (in terms of transaction and the entry/exit into/from the market). On both the counts of taxes and liquidity, equity investment appears a better alternative than debt. However, it is important to consider the volatility present in equity investment. For the risk-averse investor, debt instruments provide attractive return with low risk. Assuming debt instruments to be nearly risk-free, the 'risk premium' on equity appears to be approximately 8 % in India. Overall, it appears that India continues to be an attractive investment destination for both equity and debt instruments as it caters to the requirements of both the risk-assuming and risk-averse investors.

(iv) **Rates of Return: Disaggregative Analysis**—Overall, the returns vary along with the various segregates (age, size, ownership structure and underlying sector/industry affiliation), thus providing the investors' diversification opportunities, based on the same.

There appears to be a negative correlation between age and returns. The 'young' companies with mean returns of 43.33 % fare far better than their 'middle-aged' and 'old' counterparts with mean returns of 33.72 and 31.09 %, respectively. This is perhaps to be expected, as the companies in the 'young' segment have been observed to be affiliated with emerging and important sectors for India, such as power and infrastructure. Additionally, being new, these companies are equipped with new technologies, with new production processes and perhaps also with skilled labour force. On the other hand, the old companies seem to be saddled with 'old' technologies, old machines, more labour force (and that too relatively less skilled) and so on. Nevertheless, the equity returns for all 3 segments are commendable, though, with high degree of volatility.

In terms of size, the small and medium capitalization (cap) companies lead the returns compared to large cap companies. This could be attributed to the aspect that they are growth companies with increasing market share, whilst the large companies are mature companies with low further growth or expansion opportunities. The 'small' and 'medium'-sized companies fare better (at robust returns of 40 %) than their 'large' counterparts by 10 % points. Volatility remains evident in these segments as well.

The findings are similar to the findings of Banz (1981), Wong and Lye (1990), Lau et al. (2002) and Manjunatha and Mallikarjunappa (2012). These apparent 'age' and 'size' anomalies are also indicative of the weak form of market efficiency.

The ownership structure of the Indian corporates is dominated by 'family-owned' businesses, and their mean returns at more than 35 % (36.92) are also the highest amongst the three segments. The volatility is the highest for the 'non-PSU/non-family' segment, and at the same time, their returns are

also the lowest, amongst them. Therefore, an investment choice, they appear unattractive. The 'family-owned' and 'PSU' segments thus, not surprisingly, continue to be popular choices for equity investors.
Amongst the underlying sectors, the 'transport' and 'infrastructure' sectors recorded high returns of more than 40 %. There is evidence of high volatility amongst the sectors.

Section II: Analysis of Price Multiples

The P/E ratio signifies the price being paid by the buyer of equities for each rupee of annual earnings whether distributed as dividends or retained in the company. Despite their imperfect nature, the practical usefulness of P/E ratios is widely recognized in the world of investments in stock markets. It is a useful indicator of the investors' (market's) mood and measures the overall reasonableness or otherwise of the market's valuation.

The Indian economy appears to be led by more than six-tenths (300) of the sample companies, in terms of aggressive (high) P/E ratios of more than 10. These are the *growth* stocks amongst the sample companies. Hence, empirical evidence indicates that in cases where the portfolio was acquired at relatively low P/E ratios, the returns were commendable. The opportunity for this was provided by a prolonged rise in P/E ratios so that the earlier period purchases benefitted immensely.

Nearly 15 % of the sample companies have a P/E ratio of less than 5 as in 2014. This number has, however, come down substantially from more than 50 % in 2001. Notwithstanding the significant decrease, nearly one-sixth of the sample companies have very low P/E ratio, suggesting the presence of still a large number of undervalued companies in the Indian equity market. In marked contrast, the Indian stock market (represented by the sample companies) also appears to be overvalued (at the same time) and could be in the state of a bubble (in 2014).

In spite of the substantial drop in EPS (−144.58 %) in 2009, due to the impact of the recession originating out of the financial crisis in USA, the EPS has grown at an impressive rate of 27.01 % over the period of the study for the sample companies, indicating the robust and growing earnings capability of Indian companies.

As a result, the P/E ratio increased [albeit gradually, from 12.43 in phase 1 (2001–2008) to 13.50 in phase 2 (2009–2014)].

In continuation of the analysis of price multiples, whereas the P/E ratios indicate growth stocks, it is the P/B ratios that provide a further insight into value stocks. In prerecession years of 2005–2008, one-third of the sample companies were having P/B ratio of about 3, reflecting that the market price per share (MPS) is three times the book value (BV)/net worth of their shares; there has been a considerable decline in the P/B ratio in subsequent years. For instance, except in 2010, when the P/B ratio

was 2.93, in the other years, the value ranged from 1.86 to 2.70. Hence, the Indian stock market presents positive investment potential in such companies where the P/B ratio is on the lower side, provided of course, they are fundamentally strong.

Section III: Risk/Volatility in Returns

Although volatility in returns on equity stocks/shares is inherent, the presence of excessive volatility may not be preferred by a large number of equity investors (in particular, genuine long-term investors). Given the fact that there are an increasing number of investors willing to cross borders to diversify their portfolios, it becomes important for them to know the level/magnitude of volatility present/associated with Indian equity markets. The profile of volatility is summarized as follows:

- Whenever volatility is observed, it appears in a cluster, indicating that the market goes through a volatile ‘phase’. Technical investors may use this ‘phase’ to book returns; likewise, fundamental investors may need to wait out this volatile cluster; at the near ‘peak’ state of equity prices, they may exit the market.
- There is evidence of ‘stationarity’ (referring to a sort of lag in the volatility cluster), indicating that the volatility cluster provides a window for aggressive trading to be able to book returns especially for technical investors.
- There is presence of the ‘leverage effect’ which indicates that investors react more strongly to negative information or news; their behaviour is pessimistic; being so, they bring (sometimes) prices down to a larger extent than expected. On the other hand, the optimism reflected in increasing prices, due to positive or good news, is of a lesser degree. In other words, prices of shares do not increase to the desired extent. Good news (by and large) does not yield as much salutary impact in terms of increase in equity prices, as is expected of good news.

The findings are in conformity with the findings of Campbell and Hentschel (1992) and Engle and Ng (1993) with regard to the presence of ‘volatility clustering’ and to the findings of Black (1976), Christie (1982) and Rabemananjara and Zakoian (1993) pertaining to the ‘leverage effect’.

Section IV: Level of Market Efficiency

The last two decades (1994–2014) have seen a paradigm shift in the attitude of investors towards investing in emerging equity markets. Emerging markets like India provide a plethora of new opportunities to the investors vis-à-vis developed markets. Given this attitudinal shift, it was important to assess the level of market efficiency in the emerging markets (like India).

There exist two groups of investors in the market. Whilst the first set of investors is interested in future pay-offs (dividends), the other category is interested in profit-making by continuously buying and selling of shares (capital gains). If the first group dominates the market, the stock prices are, by and large, driven by fundamentals. In case the second group dominates, the stock prices diverge from their fundamental values; these are driven, by and large, by non-fundamental speculative factors. It is these non-fundamental speculative factors that lead to a 'bubble'. In the context of this study, market efficiency was analysed using 'rational bubbles' which are defined on the lines of Blanchard and Watson (1982) as 'self-fulfilling expectations that push stock prices towards a level, which is unrelated to the change in the market fundamentals'. It is usually characterized by a rapid increase in prices followed by a drastic fall, after which the prices return back to their mean level. The presence of 'rational bubbles' is an indication of market inefficiency.

There are two notable findings that emerge as a result of the analysis. First, 'rational bubbles' do not exist in the Indian stock market. Second, a cointegrating relationship between the prices and the dividends, with an asymmetric adjustment characterized by sharp movements, is established.

The first finding can be traced to the assumption made by Topol (1991) for bubble formation, being a weak financial policy and excessive monetary liquidity in the financial system, implying low interest rates and excessive leverage. There is, however, a prevalence of high interest rates in the Indian capital markets. In other words, assumptions requiring bubble formation do not exist in Indian equity markets. Further, excessive leverage is not present in Indian companies (Jain et al. 2013).

Second, the market returns evince nonlinear adjustment patterns with sharp movements. Further, the results indicate that the negative deviations from the fundamental value are adjusted faster vis-à-vis positive deviations and the price (and not the dividend) is responsible for most of the adjustments (evidence of the 'leverage effect').

The above discussion could make the case for a semi-strong form of efficiency, considering the price-adjusting nature of the stock market. However, the findings on price multiples indicate that most stocks in the market are either overvalued or undervalued; this indicates inefficiency in pricing. The findings of the disaggregative analysis also contain indications of 'age' and 'size' anomalies existing in the Indian stock market returns. Finally, the substantial volatility (present in the Indian stock market) weakens the case for 'semi-strong' level of efficiency. Hence, to conclude, the status of market efficiency for the Indian stock market, based on the findings, not only from the deployment of the 'rational bubbles' methodology but also from the other aspects studied (as a part of this research effort), appears to be of the 'weak' form.

Section V: Summary

This section summarizes the major findings of this study. It also provides the limitations of this research effort and the scope for future work.

Summary—In summary, the main conclusions emanating from the research undertaken are as follows:

1. Close alignment has been observed amongst actual, expected and market equity returns.
2. Companies, on an average, have been noted to have earned higher returns on equity funds deployed than the expected ROE.
3. Equity risk premium in India is around 8 %.
4. Buy-and-hold strategy for longer terms yields higher and safer returns vis-à-vis returns earned on shorter-span periods.
5. Equity investment yields higher returns (in terms of both after-tax returns and liquidity) compared to debt securities, *albeit* with significantly higher risk (particularly in the short term).
6. The capital asset pricing model (CAPM) has emerged as an appropriate tool to forecast market returns in India.
7. Factors such as age, size, ownership structure and underlying sector affect returns.
8. Indian economy is dominated by large business entities which are typically either large family-owned businesses or subsidiaries of multinational companies or public sector undertakings.
9. There is a presence of both overvalued (measured through the price/earnings (P/E) ratios) and undervalued companies (measured through price/book value (P/B) ratios) in the market.
10. High share prices in the market are supported by growth in the underlying earnings per share (EPS).
11. Volatility is present in the returns. Further, it exhibits behaviour such as 'stationarity', 'volatility clustering' and 'leverage effect'.
12. Overall, the status of market efficiency is that of the 'weak' form.

Limitations—This study has the following limitations:

(i) It is focused only on the Indian equity markets—a study comprising the equity markets of more than one country could have provided an international perspective.
(ii) It focuses only on equity returns—a study analysing other investment avenues in detail, in addition to equity returns, would be more insightful.
(iii) It is focused only on NSE 500 companies—even though the sample size allows us to present a virtual census of Indian equity market returns, there are still a sizeable number of companies (in the Indian equity market) which are not considered.

(iv) It has focused only on four segregates in the disaggregative analysis—there are many other aspects such as foreign holding and geographical location which could also be considered in the analysis.

Scope for future work—Overcoming one or more of the aforementioned limitations could provide scope for future work. Various studies, for example, a study analysing investment returns (across both equity and debt securities), one analysing equity returns across countries, another comprising a larger sample of companies and organizations and another analysing various other parameters (in the disaggregative section), could also be conducted. Researchers across the world would do well to extend this research effort, treating the present work as a base.

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